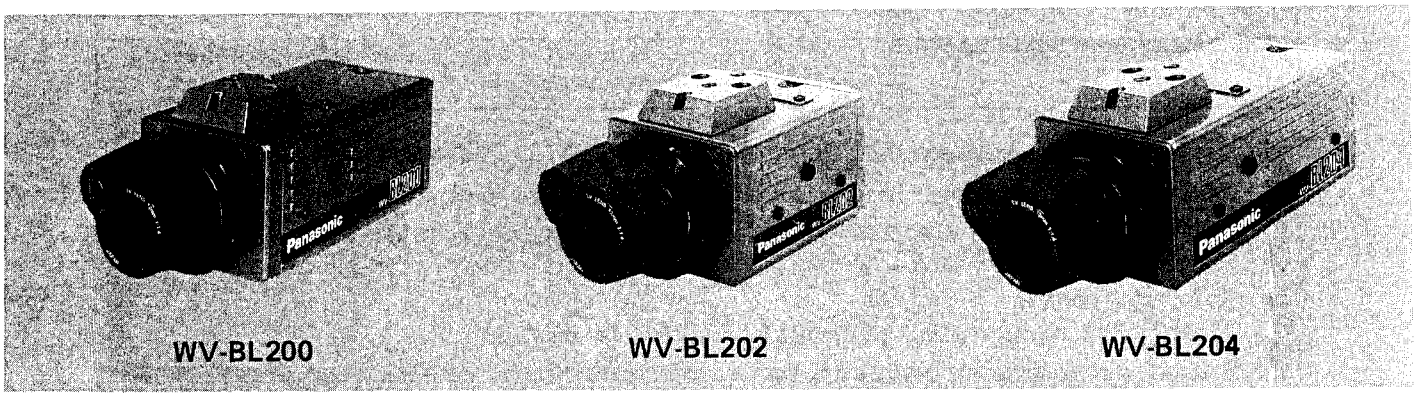
ORDER NO. AVS8902164C8

Service Manual

CCTV Camera

WV-BL200/WV-BL202/WV-BL204



SPECIFICATIONS

Pick-up Device :	577(H) x 581(V) pixels, Interline Transfer CCD
Scanning Area :	6.4(H) x 4.8(V) mm2 (Equivalent to scanning area of 1/2 pick-up tube)
Synchronization :	Internal or external switchable automatically
	Internal : Built in sync generator or Line-lock selectable (WV-BL200/WV-BL204)
	Built in sync generator (WV-BL202)
	External Input : 1.0Vp-p/75 ohms composite video signal
	(GENLOCK)
Scanning System :	2:1 Interlace
Scanning :	625 Lines/50 Fields/25 Frames
	Horizontal : 15.625KHz
	Vertical : 50Hz
Horizontal Resolution :	420 lines at center
Video Output :	1.0Vp-p/75 ohms Composite/BNC Connector
Signal to Noise Ratio :	48 dB (Typical)
Minimum Illumination :	0.5 lux at F1.4, 2856°K, AGC ON
Recommended Illumination :	20 lux at F1.4, 2856°K, AGC ON
Lens Mount :	C-Mount or Special C-mount (CS-mount)
Ambient Temperature :	-30°C ~ +60°C
Power Source :	WV-BL200/A,B : 240V AC 50Hz
	WV-BL200/C,G : 220V AC 50Hz
	WV-BL202 : 12V DC (10.8V ~ 16V)
	WV-BL204 : 24V AC 50Hz
Power Consumption :	WV-BL200/A,B : 4.6W
	WV-BL200/C,G : 4.4W
	WV-BL204 : 3.5W
	WV-BL202 : 2.2VA (12V DC, 0.18A)
Dimensions :	WV-BL200/WV-BL204 : 70(W) x 70.5(H) x 157(D)mm
(exlcuding lens)	WV-BL202 : 70(W) x 70.5(H) x 110(D)mm
Weight :	WV-BL200 : 0.88 kg
(without lens)	WV-BL202 : 0.55 kg
	WV-BL204 : 0.76 kg

Weights and dimensions indicated are approximate.
Specifications are subject to change without notice.

Panasonic

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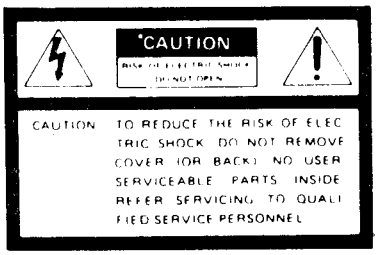
Central P.O. Box 288, Osaka 530-91, Japan


CAUTION
CAUTION TO REDUCE THE RISK OF ELEC TRIC SHOCK DO NOT REMOVE COVER (OR BACK) NO USER SERVICEABLE PARTS INSIDE REFER SERVICING TO QUALI FIED SERVICE PERSONNEL

This symbol warns the user that uninsulated voltage within the unit may have suificient magnitude to cause electric shock. Therefore, it is dangerous to make any kind of contact with any inside part of this unit.

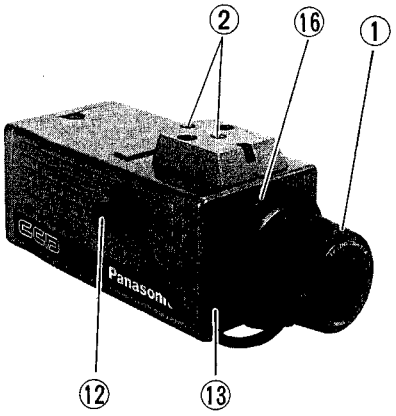
This symbol alerts the user that important literature concerning the operation and maintenance of this unit has been included.
Therefore, it should be read carefully in order to avoid any problems.

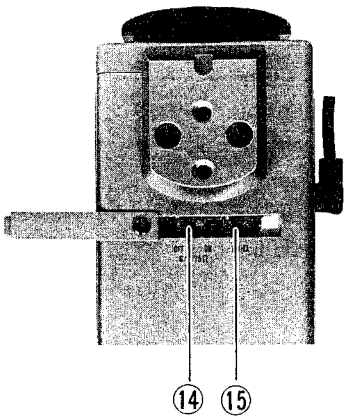
IMPORTANT SAFETY NOTICE

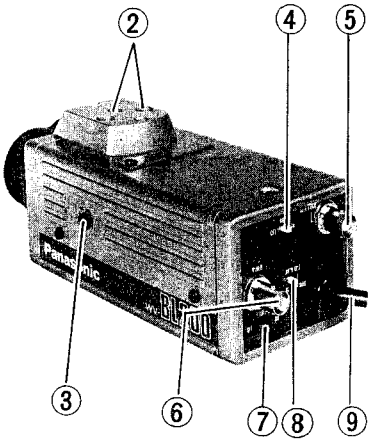
There are special components used in this equipment which are important for safety. These parts are indicated by" ⚠ " mark on the schematic diagram and the replacement parts list. It is essential that these critical parts should be replaced with manufacture's specified parts to prevent shock, fire, or other hazards.
Do not modify the original design without permission of manufacture.

MAJOR OPERATING COMPONENTS

WV-BL200







1 Automatic Iris Lens (Option)

2 Camera Mounting Screw Hole

This threaded hole (1/4"- 20)is used to mount the camera onto a mounting bracket or tripod.

3 Auto Iris level Control (ALC LEVEL, L(LOW)/H(High))

This control adjusts the iris opening of the auto iris lens when the auto iris lens which requires the DC control voltage such as WV-LA12B2 is mounted on the camera and the lens selection switch (8) is set to the DC position.

Note: When the Lens Selection Switch (8) is set to VIDEO position, the auto iris opening should be adjusted by the lens.

4 AGC ON/OFF Switch (AGC ON/OFF)

This switch is used to select the gain of the video amplifier as follows;

ON : When the lens iris is fully open at low light shooting, a clear picture is obtained by automaticly increasing the gain.

OFF : A natural and low-noise picture is obtained at low light shooting.

5 Gen-lock Input Connector (GEN-LOCK)

A composite B/W or color video signal, 1.0Vp-p/75 ohms, or black burst, 0.3Vp-p/75 ohms, or composite sync, 4Vp-p/75 ohms should be supplied to this connector for external synchronization.

6 Video Output Connector (VIDEO)

A composite video signal is provided at this connector.

7 Camera ON/OFF Switch (ON/OFF)

8 Lens Selection Switch (AUTO IRIS, DC/VIDEO)

This switch is used to select the auto iris control signal supplied to the lens from the Auto Iris Lens Connector (12).

DC : Choose this position when the auto iris control lens requiring DC contrlo signal such as WV-LA4.5, WV-LA6, WV-LA12, WV-LA18, WV-LA36, WV-LA6B2, WV-LA12B2 etc., is mounted on the camera.

VIDEO : Choose this position when the auto iris control lens requiring video signal such WV-LA8B, WV-LA-16B,WV-LA25B,WV-LA50B etc,. is mounted on the camera.

9 Power Cord (WV-BL200 Only)

10 DC 12V IN Terminal Strip (WV-BL202 Only)

This terminal accepts DC 12V power source (10.8V - 16V).

11 AC 24V In Terminal Strip (WV-BL204 Only)

Accepts AC 24V power source (19.5V - 28V).

Be sure to connect grounding lead to the GND terminal.

12 Auto Iris Lens Connector

Supplies the power and either the video signal or DC coutrol signal to the Auto Iris Lens.

The 4-pin connector is a standard accessory (Part No. YFE4191J100) for the lens which originally has different type of connector.

13 Power Indicator

14 Gen-lock Termination Switch (G/L 75ohms, ON/OFF)

When looping through the Gen-lock video input signal, set this switch to OFF position and all other cases, set this to On position

15 SYNC Selection Switch (INT/LL)

This switch is used to select the camera synchronization mode.

INT : When no signal is supplied to the GEN-LOCK input connector, the camera synchronization is set to internal 2:1 interlace mode.

Whenever the gen-lock signal is supplied to the GEN-LOCK input connector, the camera synchronization is automatically set to external synchronization mode.

LL : If no signal is supplied to the GEN-LOCK input connector, the camera synchronization is set to Line-Lock mode.

Whenever the genlock video signal is supplied to the GEN-LOCK input connector, the camera synchronization is automatically set to external synchronization mode.

16 Flange-Back Adjusting Ring

Used to adjust the back focus or picture focus by rotating this ring to clockwise for C-mount lens or counterclockwise for special C-mount (CS mount) lens.

CAUTION : 1. Always set this ring to fully clockwise before mounting the lens.

2. Do not turn this ring too much to counterclockwise when the C-mount lens is mounted as this could damage the inner glass CCD image sensor.

CONNECTION

Power Cable

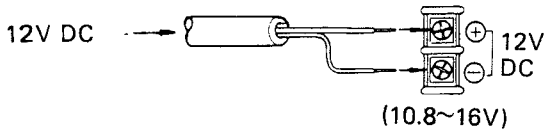
Keep the camera power switched OFF during installation.

A. WV-BL200

1. Connect the AC Power Cord (9) to a electrical outlet.

B. WV-BL202

1. A power supply of 12V DC is required.
2. Connect the power cable to the DC 12V In Terminal Strip (10) on the rear panel of the camera. Be careful not to obstruct the operation of camera ON/OFF switch.



- Calculation method of maximum cable length between camera and power supply.

  16V DC > R×I×L > 10.8V DC

  L : Cable length (Meter)

  R : Resistance of copper wire(Ω/m)

  V_A : DC voltage of power supply

  I : DC current 0.2 (A)

$$L\ standard = \frac{V_A - 12}{I \times R}\ (Meter)$$

$$L\ minimum = \frac{V_A - 16}{I \times R}\ (Meter)$$

$$L\ maximum = \frac{V_A - 10.8}{I \times R}\ (Meter)$$

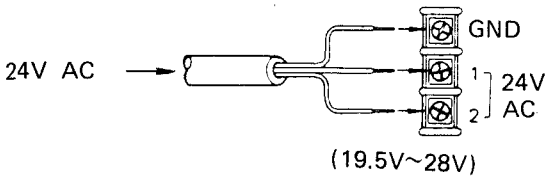
Resistance of copper wire [at 68°F(20°C)]

Cooper wire size (AWG)	# 24 (0.22mm²)	# 22 (0.33mm²)	# 20 (0.52mm²)	# 18 (0.83mm²)
Resistance ohms/m	0.078	0.050	0.030	0.018

Caution :	To prevent fire or shock hazard, the UL listed wire VW-1, style 1007 should be used for the cable for DC 12V Input Terminal.

C. WV-BL204

1. A power supply of 24V AC 50Hz is required.
2. Connect the power cable to the AC 24V In Terminal Strip (11) on the rear panel of the camera.



Recommended wire guage sizes for 24V AC line.

Cooper wire size (AWG)	# 24 (0.22mm²)	# 22 (0.33mm²)	# 20 (0.52mm²)	# 18 (0.83mm²)
Length of Cable (Approx.) [m]	100	180	250	425

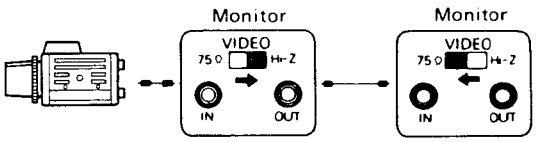
Video Cable

1. Use a video monitor whose resolution is at least equal to the camera's.

2. Terminate the camera output with 75-ohm resistor at the furthest end of its cable run.

   A. Use 75-ohm coaxial cable [3C-2V(RG-59/U), 5C-2V(RG-6/U), 7C-2V(RG-11/U), 10C-2V(RG-15/U)]

   B. Always set the last monitor's termination switch to 75 ohms, and set the termination switches of intermediate monitors to HIGH(Hi-Z)



   C. The maximum extensible coaxal cable length between the camera and the monitor is shown in the table 1. Since cable quality varies among manufacturers, please verify video quality before final installation, if maximum length are to be used.

Table 1

Type of Coaxial Cable		RG-59/U (3C-2V)	RG-6/U (5C-2V)	RG-11/U (7C-2V)	RG-15/U (10C-2V)
Recommended Maximum Cable Length	(ft)	825	1,650	1,980	2,640
	(m)	250	500	600	800

3. Wiring precautions:

o Do not bend coaxial cable into a curve whose radius is smaller than 10 times the cables diameter.

o Never staple the cable - not even with circular staples. Mismatching will occur.

o Never crush or pinch the cable.

All these will change the impedance of the cable and cause poor picture quality.

LENSES

Selection of Lens

It is recommended to use the following Auto Iris Control Lens.

Specifications \ Models		WV-LA2.8 (Wide Angle)	WV-LA4.5 (Wide Angle)	WV-LA6B2 (Wide Angle)	WV-LA12B2 (Standard)	WV-LA18 (Telephoto)	WV-LA36 (Telephoto)	WV-LA81/6 (Motorized Zoom)
Image Size		1/2" (6.4 (H) x 4.8 (V) mm)						
Focal Length		2.8 mm	4.5 mm	6 mm	12 mm	18 mm	36 mm	8.5 - 51 mm (6X)
Maximum Aperture Ratio		1 : 1.4	1 : 1.4	1 : 1.4	1 : 1.4	1 : 1.4	1 : 1.8	1 : 1.2 (Wide) 1 : 1.3 (Tele)
Angular Field of View	H	107°17'	70°6'	56°47'	30°26'	20°36'	10°13'	41°56' (Wide) 7°14' (Tele)
	V	88°4'	55°41'	43°31'	22°49'	15°22'	7°39'	31°19' (Wide) 5°28' (Tele)
Focusing Range		Adjusted by Camera	0.92 (ft) - ∞ 0.3 (m) - ∞	Adjusted by Camera		0.89 (ft) - ∞ 0.27 (m) - ∞	3.3 (ft) - ∞ 1 (m) - ∞	3.3 (ft) - ∞ 1 (m) - ∞
Mount		Special C-mount (CS mount, 1" - 32UN)						
Optional Filter Size		None	φ 37.5 mm P = 0.5	None	None	φ 37.5 mm P = 0.5	φ 37.5 mm P = 0.5	φ 49 mm P = 0.75
Dimensions		φ 1-11/16" x 1-5/16" (φ 43x34mm)	φ 1-11/16" x 1-5/8" (φ43x41mm)	φ 1-11/16" x 1-3/8" (φ43x36mm)	φ 1-11/16" x 1-3/8" (φ43x36mm)	φ 1-11/16" x 1-5/8" (φ43x41mm)	φ 1-11/16" x 1-5/8" (φ43x41mm)	3-3/8"(W)x2-7/16"(H) 3-7/8" (D) 86(W)x62(H)x
Weight		0.14 (65 g)	0.18 (80 g)	0.11 (50 g)	0.088 (40 g)	0.15 (70 g)	0.18 (80 g)	0.92 (420 g)

When a manual iris control lens is to be used with, the following lenses are recommended. In this case, the lighting condition should not be varied.

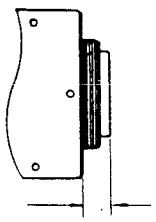
Specifications \ Models		WV-LM4.5 (Wide Angle)	WV-LM6B2 (Wide Angle)	WV-LM12B2 (Standard)
Image Size		1/2" (6.4 (H) x 4.8 (V) mm)		
Focal Length		4.5 mm	6 mm	12 mm
Maximum Aperture Ratio		1 : 1.4	1 : 1.4	1 : 1.4
Angular Field of View	H	70°6'	56°47'	30°26'
	V	55°41'	43°31'	22°49'
Focusing Range		Adjusted by Camera		
Mount		Special C-mount (CS mount, 1" - 32UN)		
Optional Filter Size		φ 37.5 mm, P = 0.5	None	None
Dimensions		φ 1-11/16" x 1-9/16" (φ 43 x 41 mm)	φ 1-11/16" x 1-1/2" (φ 43 x 39 mm)	φ 1-11/16" x 1-1/2" (φ 43 x 39 mm)
Weight		0.165 (75 g)	0.1 (45 g)	0.077 (35 g)

* Dimensions and weight indicated are approximate.

* Specifications are subject to change without notice.

When you use the lens other than listed above, lens mount should be C-mount or special C-mount (CS mount (1"-32UN)) and lens weight should be less than 420g . If not, both the lens and camera should be secured.

The protrusion of the rear of the lens should be as shown in the right.



C-mount : Less than 7/16" (Less than 11.5 mm)

CS mount : Less than 1/4" (Less than 7.2 mm)

CIRCUIT DESCRIPTION

1. Principle of Black and White CCD Camera

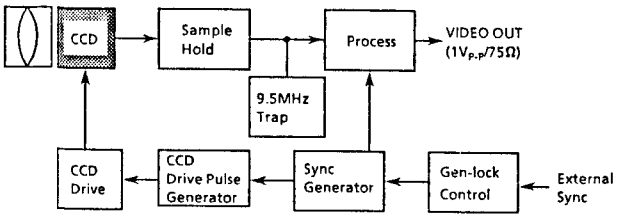


Fig. 1-1 Block Diagram of WV-BL200 Series

The incoming light which passes through the lens reaches the surface of the CCD (Charge Coupled Device) image sensor. The CCD image sensor produces the output signal whose signal level corresponds to incoming light intensity. The output signal is converted into video signal by sample hold circuit. This signal is sent to signal processing circuit where their gamma characteristics is corrected, signal level is set and sync signal is mixed for forming composite video signal.

The sync generator generates necessary pulses for producing the composite video signal and sends them to the CCD drive pulse generator circuit and signal processing circuit.

The CCD drive pulse generator generates H. and V. transfer pulses which are synchronized with the H. and V. drive pulses and sends them to the CCD image sensor through CCD drive circuit for driving sensor.

The gen-lock control circuit receives external sync signal and generates clock pulse which supplied to sync generator circuit for synchronizing the horizontal (H.) and vertical (V.) sync signal.

2. Sensor Board

This board receives the pulses from Drive board and sends these pulses to CCD image sensor IC1 in order to take out the CCD output signal.

The CCD output signal obtained at pin 3 of IC1 is fed through buffer Q1 to the Process board to convert it into the video signal.

• CCD Image Sensor

The CCD image sensor used in camera is interline transfer CCD sensor.

The CCD image sensor has 335,237 picture elements (horizontal 577 × vertical 581).

Its image size is 6.58mm (H) × 4.88mm (V) so that 1/2-inch optics and lens can be used.

The CCD image sensor is mounted on dual in line package with 20 pins and has a optical window in front of the cell as shown in Fig 2-1.

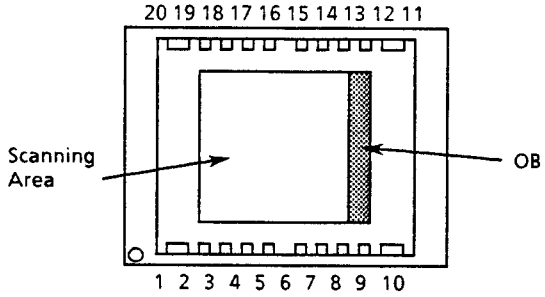


Fig. 2-1 Appearance of CCD Image Sensor

Items	Value	Unit
Chip Size	14.4 (V) × 17.4 (H) (Excluding Base)	mm^2
Cell Size	11.4 (H) × 8.4 (V)	μm^2
Image Size	6.58 (H) × 4.88 (V)	mm^2
Number of Elements	577 (H) × 581 (V) Signal elements	PCS
	603 (H) × 585 (V) Total elements (Including OB)	PCS

Table 1 Specification of CCD Image Sensor

The pin identification of CCD image sensor is as follows.

Pin No	Name	Description
1	OD1	Output Drain1
2	OD2	Output Drain2
3	OS	Output Transistor Source
4	SS1	Substrate 1
5	RD	Reset Drain
6	RS	Reset Gate
7	øHIB	H Transfer Pulse
8	SS2	Substrate 2
9	øH2	H Transfer Pulse 2
10	øH1A	H Transfer Pulse 1
11	IS	Input Source
12	IG	Input Gate
13	TP	Test Terminal
14	øV1	V Transfer Pulse 1
15	øV2	V Transfer Pulse 2
16	SS3	Substrate 3
17	øV3	V Transfer Pulse 3
18	øV4	V Transfer Pulse 4
19	OG	Output Gate
20	OFD	Overflow Drain

• **Constitution and Outline of Transfer of CCD Image Sensor**

CCD image sensor is made up of a simple MOS structure and consists of;

(1) Photo diode(PD) .. Generates charge packets corresponding to the incoming light intensity.

(2) V-CCD ..... Accumulates the charge packets from PD and transfers them in the vertical direction.

(3) H-CCD ..... Transfers charge packets in the horizontal direction on the output.

(4) Output Section ... Outputs the signal transferred from the H-CCD sequentially.

The block diagram of CCD image sensor is show below.
Each pixel corresponds to one photo diode.

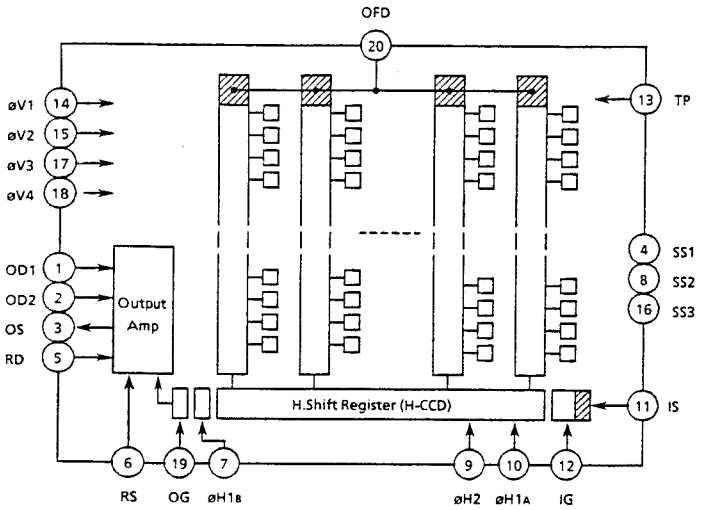


Fig2-2 Block Diagram of CCD Image Sensor

• **Interline Transfer System**

When the incoming light reaches the photo diode, the signal-charges are accumulated according to the intensity of light. Accumulated charge packets on the independent sensor (photo diode) are transferred to the vertical shift register (V-CCD) all at once in every vertical blanking period. They are then shifted one-step down to the horizontal shift registor (H-CCD) in every horizontal blanking period. The charge packets in H-CCD are transferred to the output amplifire by turns, and taken out as the output signal.

3. Process Board

3-1 Signal Processing Circuit

This circuit recieves the modulated CCD output signal and generates video signal.

• **Sample Hold Circuit**

The modulated CCD output signal is supplied through pin 2 to clamp circuit in IC1 in the Process sub board where the modulated CCD output signal is clamped by specified DC voltage. The clamped signal is then sent to the sample hold circuit which eliminates reset pulse and noise component on the CCD output signal and detects prevideo signal. This signal is supplied fed to amplifier Q19/Q20 and amplified. The amplified prevideo signal is fed to 7.36 MHz low pass filter CF1 which removes horizontal transfer pulse component (10.7 MHz) from prevideo signal. This signal is fed through inverter Q7 to optical black (OB) clamp circuit in IC3.

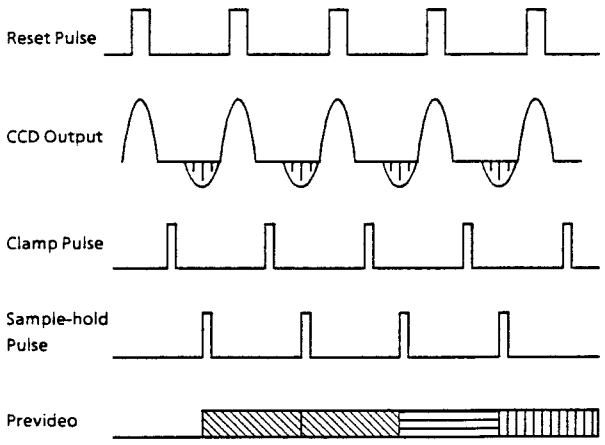


Fig. 3-1 Waveform of Sample Hold

• **Optical Black Clamp Circuit**

Prevideo signal from inverter Q7 is fed through pin29 to optical black (OB) clamp circuit in IC3. A optical black for blocking the incoming light is built at the end of horizontal scanning period on the surface of CCD image sensor.

When the CCD reads out optical black portion, the dark current of the CCD is detected and this signal portion is clamped to a DC potential. However this dark current is fluctuated due to variation of CCD temperature. So that thermo-detect resistor is placed beside the CCD for producing compensation current at the Mother board. The compensation current is supplied to pedestal clamp circuit. Therefore black level variation due to change of dark current is eliminated.

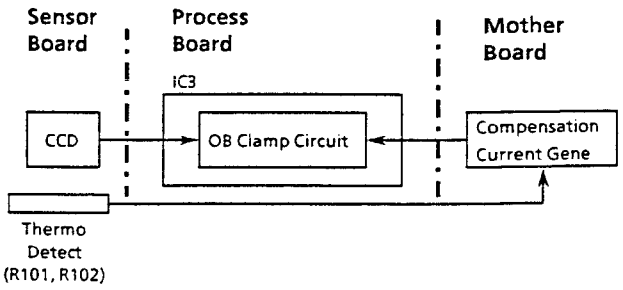


Fig 3-2 OB Clamp Circuit

The clamped video signal is mixed with the wide horizontal drive (WHD) pulse which is separated in IC3 from the mixed signal of clamp pulse-1 (CP1) and WHD pulse and the noise during the blanking period is removed. This signal is supplied to gain control circuit and automatic light control(ALC) circuit.

• Gain Control Circuit

When AGC ON/OFF switch on the rear of camera is set to OFF position, low(L) level is obtained at pin1 of CN1 and the L level is converted to high(H) level by inverter IC1. The H level is then supplied to pin 7 of IC2 for connecting pins 6 and 5 of analog switch. Therefore gain control DC bias set by VR2(GAIN SET) is supplied to gain control circuit in IC3 through pin 28 for setting the amplitude of gain control circuit to standard state.

When AGC ON/OFF switch is set to ON position, H level is obtained at pin1 of CN1 and the H level is supplied to pin3 of IC2. As a result, pins1 and 2 of IC2 are conducted and gain control DC bias generated by AGC detector circuit in IC3 and VR3 (AGC SET) is supplied through pin 28 of IC3 to gain control circuit in IC3 for controlling the amplitude of gain control circuit.

The gain controlled video signal is then fed through pin27 of IC3 to 10.8 MHz trap CF2 where the remaining switching noise on the video signal is eliminated. This signal is fed through buffer Q8 and pin 24 of IC3 to clamp circuit where the video signal is clamped to specified clamp DC level. The clamped video signal is supplied to gamma correction circuit in IC3.

• Gamma Correction Circuit

The gamma(γ) correction circuit corrects the non-linear photoelectric conversion characteristic of cathode ray tube (CRT) and reproduces a linear picture of high fidelity on the monitor.

In order for a televised picture to have the same contrast gradation as the original scene, the gamma of the system including CCD image sensor, signal processing inside camera and monitor must be equal to 1.0.

The gamma characteristic of CCD image sensor is approximately 1.0 and the gamma characteristic of the monitor is approximately 2.2, so that the gamma characteristic of the gamma correction circuit should be approximately 0.45 which makes the total gamma to be approximately 1.0.

The gamma corrected video signal is supplied to AGC detection circuit and level control circuit respectively.

• AGC Detection Circuit

The video signal from gamma correction circuit is peak-rectified in the AGC detect circuit and converted into DC voltage corresponding to the video signal level that is, incoming light intensity. The DC voltage obtained at pin4 of IC3 is supplied through pin5 to amplifier (AGC OP AMP) in IC3 where it is compared with the reference DC voltage.

The error DC voltage obtained at pin6 of IC3 is fed back through IC2 to gain control circuit in IC3 to control the amplitude.

When the camera is used in the normally illuminated scene, the amplitude of gain control circuit does not change. However, when the camera is aimed at the weakly illuminated scene, lens iris is fully opened and the video signal level is decreased. The decreased video signal level is detected by the AGC detection circuit and the amplitude to relatively low illumination is controlled.

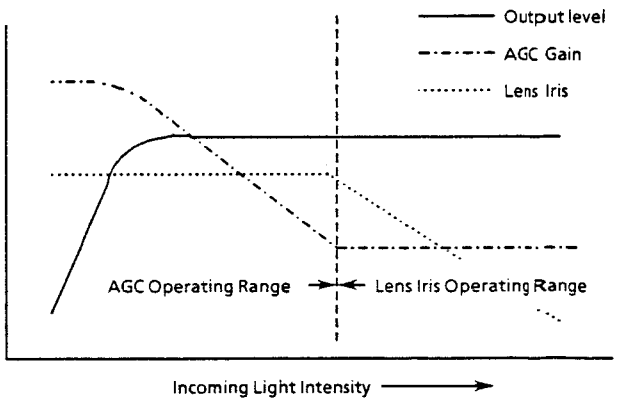


Fig. 3-4 AGC Operation

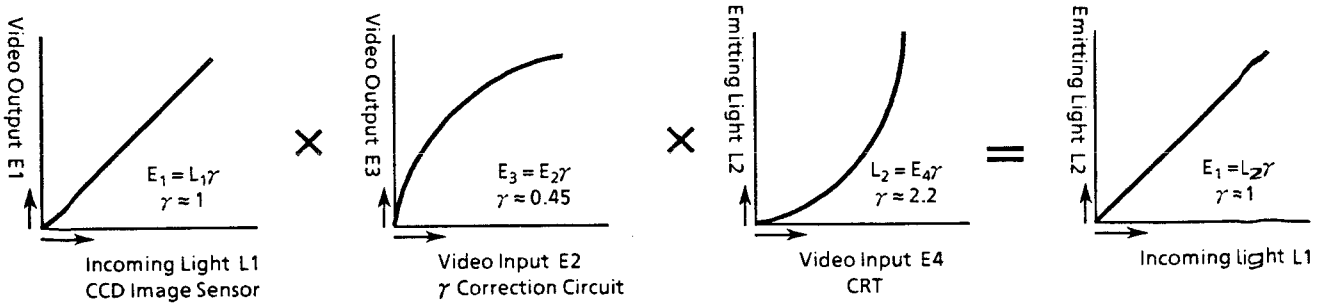


Fig. 3-3 Gamma Correction

• **Horizontal Aperture Signal Generator Circuit**

The video signal from gamma correction circuit obtained at pin22 of IC3 is fed through VR4(Y.LEVEL) and buffer Q9 to horizontal aperture signal generator circuit.

When the camera is aimed at object(A) for example, the signal(B) obtained at buffer Q9 and passed through pin 20 of IC3, signal(C) delayed 110ns by delay line CF4 and amplified by aperture amplifier (AP AMP) in IC3 and signal(D) which results from the delayed video signal being reflected back through CF4 and the delayed again (220ns) appear at the output of the H. aperture generator circuit where they are mixed in fixed proportions to make up the H. aperture signal(E).

The H. aperture signal obtained in this way and fed through pin17 of IC3, buffer Q14 and pin16 of IC3 is mixed with the video signal sent through buffer Q11 and H. aperture-mixed video signal(F) is made.

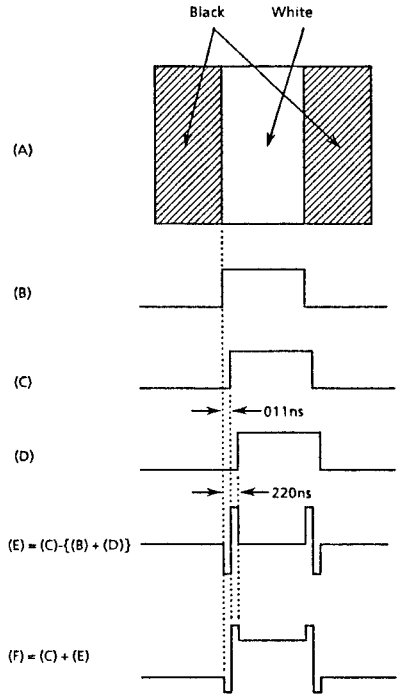


Fig. 3-5 Horizontal Aperture signal.

• **Video Signal Processing Circuit**

The video signal(A) from Y/Aperture mix circuit is forwarded to clamp circuit where the blanking level of the mixed signal is clamped to specified DC level.

The clamped video signal is then sent to the BL mix, high clip, low clip circuit where it is mixed with the blanking pulse(B). The high clip circuit clips the high level signal and the low clip circuit clips the low level portion of mixed signal(C) for setting the pedestal level(D).

The mixed signal undergoes the high and low clip is mixed with the sync signal(E) through pin12 of IC3 for forming a composite video signal(F). The composite video signal obtained at pin13 of IC3 is supplied through pin8 of CN2 to video output circuit on the DC/DC board.

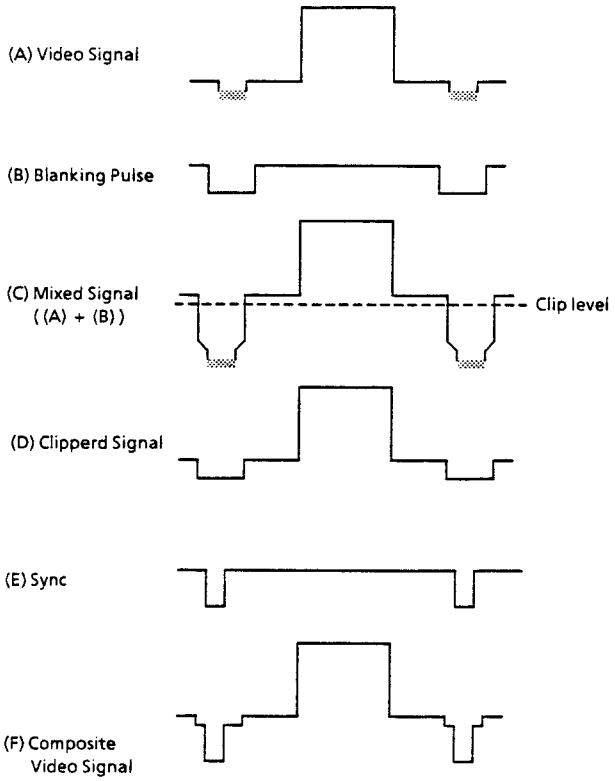


Fig. 3-6 Video Signal

3-2 ALC Circuit

• **ALC Video Output Circuit**

The prevideo signal passes CF1 is fed through buffer Q1-2 to clamp Q3 where the blanking periods of prevideo signal are clamped to specified DC level by clamp pulse1(CP1) fed from pin20 of CN2. The clamped prevideo signal is then applied to sync mix Q2 where prevideo signal and composite sync signal(SYNC) fed from pin25 of CN21 are mixed to produce composite video signal. This signal is amplified by Q1-1 and supplied to Switch board. When lens selection switch SW2 on the Switch Board is set to video position, prevideo signal made by this circuit is sent out from lens connector.

• **ALC DC Output Circuit**

The prevideo signal mixed with the WHD in IC3 sent through ALC amplifier, ALC gamma correction and DC control circuits to ALC detection circuit in IC3 where the video signal is converted into DC voltage corresponding to the incoming light intensity. This detected DC voltage obtained at pin38 of IC3 is fed through VR5(ALC1) and pin 41 of IC3 to error amplifier (ALC OP1 AMP) in IC3 where the DC voltage is compared with reference DC voltage and the error DC voltage obtained at pin40 of IC3 is supplied through buffer Q13 and Q12 to Switch board. When lens selection switch SW2 on the Switch board is set to DC position, this error DC voltage is supplied to lens iris drive coil of the ALC lens to directly control the lens aperture.

3-3 Gen-lock Control Circuit

This circuit generates reference 17.7MHz clock signal which is sent to sync generator in the Drive board for generating the sync and transfer pulses.

This circuit also recives a gen-lock signal such as composite video signal and compares it in phase with horizontal pulse generated in the sync generator.

The resultant in comparison controls generating reference 17.7MHz clock signal and the clock signal is then fed to the sync generator. Thus horizontal pulses synchronized with the gen-lock signal is generated. In the gen-lock mode, the vertical reset pulse is generated from the gen-lock signal and it is fed to the sync generator to generator vertical pulses synchronized with the gen-lock signal.

The pin identification of gen-lock control IC5 (YWPD65012GB) is as follows.

Pin No.	Name	In/Out	Description
1	VR	Out	Vertical Reset Pulse
2	HV	Out	H/V Select Control
3	EXH	In	External Horizontal Sync Signal
4	I1	In	Mode Select (H:LL, L:INT/EXT)
5	MI2	---	Not Used
6	MI3	---	Not Used
7	MI4	---	Not Used
8	EXV	In	External Vertical Sync signal
9	TSTI	---	Not Used
10	VDO	---	Not Used
11	DPC	In/Out	VD Phase Control
12	TCK1	---	Not Used
13	TCK2	---	Not Used
14	VCOI	---	Not Used
15	VCOO	---	Not Used
16	CLKO	---	Not Used
17	GND	---	Ground
18	EVS	In	M.M Select(H:INT, L:EXT)
19	PN1	In	SC Counter Select
20	PN2	In	System Mode Select (H:EIA, L:CCIR)
21	PCO1	Out	Phase Comp. Delay Det. (H:Delay)
22	PCO2	Out	Phase Comp. Forward Det. (L:Forward)
23	CLRP	---	Not Used
24	EI	Out	EXT/INT Mode Select (H:EXT, L:INT)
25	HPC	In/Out	Horizontal Phase Control
26	S1	---	Not Used
27	SO	---	Not Used
28	D1	---	Not Used
29	DO	---	Not Used
30	OS	---	Not Used
31	OD	---	Not Used
32	IV2	Out	INT 1/2V Pulse
33	VLP	In	Line-lock Pulse
34	TSTM	---	Not Used
35	VLO	---	Not Used
36	LPC	---	Not Used
37	ENA	---	Not Used
38	CLR1	---	Not Used
39	VDD	In	+ 5V DC Power
40	VSRS	---	Not Used
41	SCN	---	Not Used
42	SC	In	Subcarrier
43	NWHD	---	Not Used
44	WHD	In	Wide Horizontal Drive pulse

- **INT 17MHz Oscillator**

When sync selection switch SW2 on the DC/DC board is set to INT position and no external sync signal is supplied to Gen-lock connector on the rear of camera, Pin 4 of IC5 receives L level and sends out L level from pin24. The L level is supplied to INT/EXT switching IC7 and the 17.734476MHz clock signal oscillated by crystal oscillator X1 is supplied through IC7 and pin7 of CN2 to Drive board.

- **EXT 17 MHz Oscillator**

When sync selection switch SW2 on the DC/DC board is set to INT position and external sync signal such as composite video signal is supplied to Gen-lock connector on the rear of camera, IC5 functions in external sync mode and pin24 sends out H level.

The externally supplied gen-lock signal obtained at pin11 of CN1 is fed to sync separator circuit consisting of Q15 and Q16 where the sync signal is extracted and supplied to pin3 of IC5. At this time, H level from pin 2 of IC5 is supplied to pins 9 and 10 of IC6, also H level from pin24 of IC5 is supplied to pins 1, 12 and 13 of IC6. The H sync signal fed to pin 3 of IC5 is compared in phase with the wide horizontal drive (W HD) pulse and resultant in comparison obtained at pins 21 and 22 is sent through IC6 to external 17 MHz voltage controlled oscillator (VCO) consisting of D1, D2, C49-C51 and L7 (EXT VCO ADJ).

As a result, 17MHz clock signal oscillated by external 17MHz voltage controlled oscillator(VCO) circuit is supplied to Drive board through IC7.

At the same time, vertical reset pulse made from the Gen-lock signal and obtained at pin 1 of IC5 is sent via IC6 to the sync generator to reset it vertically.

- **Line-lock Control (WV-BL200 and WV-BL204 only)**

When sync selection switch SW2 on the DC/DC board is set to LL position, H level obtained at pin 14 of CN2 is supplied to pin 4 of IC5 and pin 11 of IC6 respectively for enabling this gen-lock control circuit to line-lock mode, low level at pin 2 of IC5 is fed to pins 9 and 10 of IC6 and high level at pin 24 of IC5 is applied to pins 1, 12 and 13 of IC16.

In this stage, the vertical pulse made by dividing the wide horizontal drive (W HD) pulse at pin 44 of IC5 is compared in phase with the vertical pulse generated from 50Hz line signal by IC4 and supplied to pin 33 of IC5.
The resultant in comparison is then sent from pins 21 and 22 through IC6 and buffer Q18 to voltage controlled oscillator (VCO) consisting of D1, D2, C49-51, L7 (EXT VCO ADJ) to control oscillating frequency. The oscillating frequency is sent to sync generator in the Drive board to generate the WHD pulse. In this way, the phase lock loop (PLL) circuit is formed and sync generator generates WHD pulse which is synchronized with 50Hz line signal.
At the same time, 50Hz line signal sent from the Power board is fed through monostable multivibrator (MMV) IC4 to pin 23 of IC5 to generate a vertical reset pulse. The V reset pulse obtained at pin 32 of IC5 is fed via IC6 to sync generator in the Drive board to generate the vertical rate pulses which are synchronized with the line signal.

4. Drive Board

4-1 Sync/Drive Signal Generator

This circuit consists of IC4 and generates pulses necessary to produce the video signal and to drive the CCD image sensor. The pulses are made from 17MHz clock signal sent to pin 29 of IC4. In gen-lock mode, the externally controlled 17MHz clock signal and V. reset pulse are supplied from Process board to pin29 and pin31 of IC4 respectively.

The pin identification of IC4 (YWTC6013U) is as follows.

Pin No.	Name	In/Out	Description
1	HD	Out	Horizontal Drive Pulse
2	PS	In	Phase Comparator Pulse
3	RHD	Out	Horizontal Drive Pulse
4	PDO	Out	Phase Comparator Output
5	VDD	-	+ 5V DC Power
6	VSS	-	Ground
7	CKI	In	10.875MHz Clock Signal
8	INT	In	Accumulator Select (H : Field / L : Frame)
9	SHT	In	Shutter Mode Select (H : Normal / L : Shutter)
10	RESET	In	Not Used
11	VHP	Out	øH Inhibit Pulse
12	LI	Out	Not Used
13	PBLK	Out	Composite Preblanking Pulse
14	SYNC	Out	Composite Synchronize Pulse
15	CBLK	Out	Composite Blanking Pulse
16	PAP	Out	Not used
17	VDD	-	+ 5V DC Power
18	VSS	-	Ground
19	CP1	Out	OB Clamp Pulse
20	CP2	Out	Signal Clamp Pulse
21	CP3	Out	Not Used
22	PBF	Out	Not Used
23	BF	Out	Not Used
24	BSC	Out	Not Used
25	SC1	Out	4.43MHZ Subcarrier
26	SC2	Out	Not Used
27	TEST	In	Not Used
28	VSS	-	Ground
29	CK4FSC	In	17.7MHz Clock Pulse
30	VD	Out	Not Used
31	VRS	In	Vertical Reset Pulse
32	FI	Out	Not Used
33	CF	Out	Not Used
34	WID	Out	Not Used
35	HP	Out	Not Used
36	FRM	Out	Not Used
37	FV1N	Out	V-CCD Transfer Pulse-1
38	FV2N	Out	V-CCD Transfer Pulse-2
39	VDD	-	+ 5V DC Power
40	FV3N	Out	V-CCD Transfer Pulse-3
41	FV4N	Out	V-CCD Transfer Pulse-4
42	FSAN	Out	V-CCD Readout Pulse-1
43	FSBN	OUT	V-CCD Readout Pulse-2
44	PR	In	Phase Comparator Signal

● **Sync Signal**

The composite blanking pulse (CBL) from pin15 of IC4 fed through inverter IC5 and clamp pulse-2(CP2) from pin20 are mixed at cross point of R46 and R47 and then sent to Process board.
The pre-blanking pulse(PBLK) from pin13 of IC4 and clamp pulse-1(CP1) from pin19 are mixed at cross point of R51 and R53 and then send it to Process Board. The CP1 is also directly sent to the Process board.

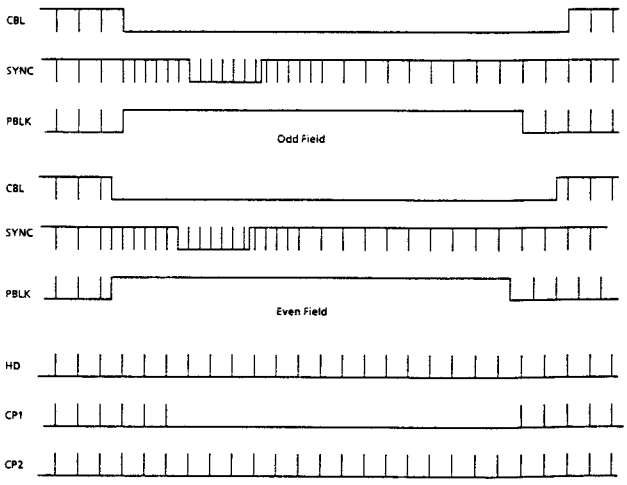


Fig. 4-1 Sync Signal

The horizontal drive pulse(HD) from pin1 of IC4 is fed through pulse drive amplifier Q7 and Q8 to DC/DC board. The WHD pulse is directly fed to the Process board from pin 1 of IC4. The sync signal at pin 14 of IC4 is sent to the Process board.

- **Drive Signal**

The vertical drive timing pulse for CCD image sensor are also generated by IC4 together with 21MHz VCO circuit and IC3.
The V. drive timing pulses from pins 37 - 43 of IC4 are sent to øV drive IC1 where the level of V. drive pulse is converted to specified level corresponding to the V. transfer timing of CCD image sensor. These signals are supplied to sensor board to drive the CCD image sensor.

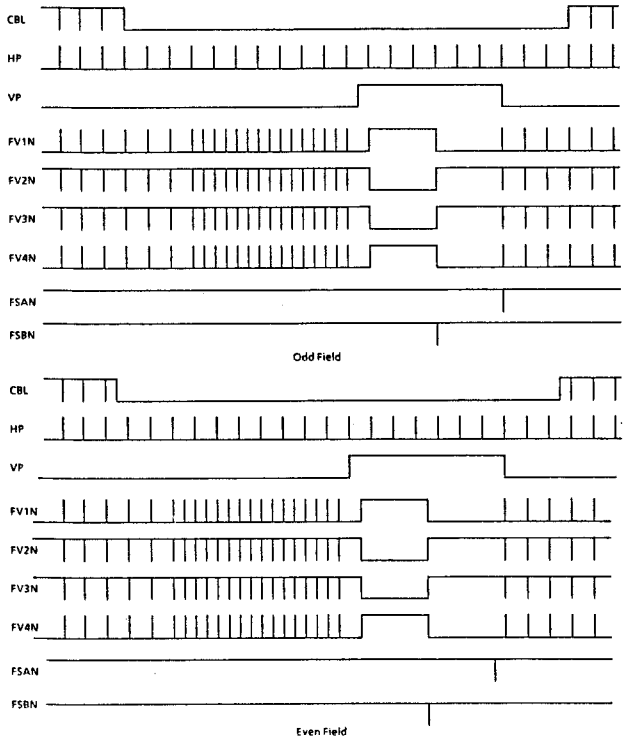


Fig. 4-2 Drive Signal

4-2 21MHz Clock Generator

This circuit generates 21.75MHz clock signal utlizing voltage controlled oscillator(VCO) circuit consisting of D1,D2, R20, R22, R23, C12, C14, C15 and L2(VCO ADJ).
The 21.75MHz clock signal obtained at pin4 of IC2 is supplied to pin26 of IC4. In IC4, 21.75MHz clock signal is divided by 1/2 to generate 10.875MHz. The 10.875MHz signal at pin 15 of IC3 is sent to pin 7 of IC4 and divided by 1/232 and approximately 15.625KHz signal is generated. On the other hand, 17MHz clock signal fed to pin29 of IC4 is divided by 1/1135 times in IC4 and approximately 15.625KHz signal is generated.

The both 15.625KHz signal obtained at pins 44 and 2 of IC4 are compared in phase and phase difference is converted into DC bias and obtained at pin4 of IC4. This DC bias is fed through low pass filter(LPF) Q6 to 21 MHz VCO circuit for forming phase locked loop(PLL) circuit to synchronize 21MHz signal to reference 17MHz clock signal.

Fig. 4-3 Block Diagram of Clock Generator Circuit

4-3 H. Transfer Pulse Generator

This circuit consists of IC3 and generates H. transfer(øH) pulse to drive CCD image sensor.
The IC3 receives 21.75MHz clock signal at pin26. It is divided by 1/2 to generate øH1A, øH1B, øH2 and øRS pulses obtained at pins 30, 31, 37 and 36 respectively. These pulses are sent to Sensor board.

4-4 Bias Circuit

This circuit produces various DC bias for CCD image sensor and øV drive.
Approximately 4.0V of output gate(OG) bias voltage set by VR2(VOG ADJ) is supplied to CCD image sensor.
Overflow drain(OFD) bias set by VR1(V_{OFD} ADJ) is supplied through buffer Q9 to CCD image sensor.
Approximately +12V obtained at emitter of Q1 is supplied to pin16 of øV drive IC1 to set high level (øVH) of vertical transfer pulses..
Approximately -7.0V obtained at emitter of Q2 is supplied to pin1 of øV drive IC1 for setting low level (øVL) of øV pulses.

The pin identification of IC3 (YWTC6003F) is as follows.

Pin No.	Name	In/Out	Description
1	GRB	In	Not used
2	FRB	Out	Not used
3	G1A	In	Not Used
4	FC1	Out	Not Used
5	VDD	-	+5V DC Power
6	VSS	-	Ground
7	VSS	-	Ground
8	G1B	In	Not used
9	FC2	Out	Not used
10	G2A	In	Not Used
11	FC3	Out	Not Used
12	G2B	In	Not Used
13	FC4	Out	Not Used
14	FC5	Out	Not Used
15	LCK	Out	Clock Pulse
16	VSS	-	Ground
17	VDD	-	+5V DC Power
18	GC	In	+5V DC Power
19	DMC	Out	Not used
20	DMCN	Out	Not Used

21	DMPC	In	Ground
22	VSS	-	Ground
23	VP	In	Ground
24	HP	In	H-CCD Drive Control Pulse
25	CKO	Out	Inverted Clock Pulse
26	CKI	In	Master Clock Signal
27	Vss	-	Ground
28	Vss	-	Ground
29	VDD	-	+5V DC Power
30	H1A	Out	H. Transfer Pulse-1 A
31	H1B	Out	H. Transfer Pulse-1 B
32	VSS	-	Ground
33	RS1	Out	Not used
34	MODE	In	+5V DC Power
35	EN	In	Ground
36	RS2	Out	CCD Reset Gate Pulse
37	H2	Out	H Transfer Pulse-2
38	VSS	-	Ground
39	VDD	-	+5V DC Power
40	BP1	Out	Clamp Pulse
41	BP2	Out	Sample Hold Pulse
42	BP3	Out	Sample Hold Pulse
43	GPA	In	Not Used
44	FRA	Out	Not Used

5. DC/DC Board

5-1 Power Circuit

The W.HD pulse generated in Drive board and obtained at pin12 of CN1 is ampified by pulse drive Q1 and Q2 for necessary level and supplied to the primary winding of T1.
The boosted/attenuated pulses obtained at the secondary winding of T1 are rectified to generate necessary DC voltage.

- +20V DC generated by rectifying the boosted pulse at T1 with D2 is supplied to the Drive board.
- +6V DC generated by rectifying the attenuated pulse at T1 with D3 is supplied to the Drive board.
- -11V DC generated by rectifying the pulse with D4 is supplied to the Drive board.

5-2 Regulator Circuit

- **+9V Regulator**

+12V DC power from Power board (WV-BL200 and WV-BL204) or external power supply is applied to emitter of Q101 mounted on the chassis. IC3 amplifies the error between reference voltage generated in IC3 and potential at pin3 of IC3 set by VR1(+9.2V ADJ) and forwards it to base of Q101. If the collector potential of Q101 changes, potential at pin3 of IC3 also changes and a voltage change appears at pin1 of IC3. This change controls base current of Q101 in the direction which opposes the voltage change appears at its collector. As a result, the output voltage remains constant.

- **+1.8V Regulator**

+1.8V is generated from +5V(1) DC power using IC1(a). The output voltage of IC1(a) is applied to pin2 of IC1(a) to form a feedback loop for regulating the voltage. The reference voltage is obtained by dividing the +5V(1) DC using R15 and R16.

- **+5V(2) Regulator**

+5V(2) DC is generated from +6V DC power using IC1(b). The +1.8V from IC1 (a) is compared in IC1 (b) with the voltage obtained by dividing +5V with R13 and R14. The error obtained in IC1(b) is applied to base of Q3 to control the base bias of Q3 and regulated +5V is obtained at the collector of Q3.

- **+5.3V Regulator**

+5.3VDC is generated from +9V DC power using IC2(a). The output voltage at pin1 of IC2(a) is applied through R10 to pin2 of IC2(a) to form a feedback loop, and thus stabilizing the voltage. This +5.3V DC is applied to pulse drive on the power circuit for increasing the common line of power circuit, and thus +3.7V power appears on the primary circuit of power circuit.

The reference voltage is obtained by dividing the +9V DC using R5-R9.

- **+5V(1) Regulator**

+5V DC is generated by regulating +9V DC using IC2(b). The output voltage obtained at pin7 of IC2(b) is applied through buffer Q4 to pin5 of IC2(b) to form a feedback loop, and thus stabilizing the voltage. The reference voltage is obtained by dividing the +9V DC using R6 and R5. The current from +9V DC through primary winding of T1, Q2 and +5.3V line is mixed at Q4 for supplying the large current on the +5V(1) DC power source.

5-2 Video Output Circuit

2Vp-p composite video signal produced at Process board and obtained at pin7 of CN1 is fed through buffer Q5 to 5.45MHz L.P.F CF1 where the band width of video signal is limited to less than 5.45MHz. This signal is amplified 6dB by amplifier Q6 and fed through buffer Q7 to video output drive circuit consisting of Q8-Q11. The video signal from video output drive circuit is supplied through pin18 of CN1 to video output connector of camera.

6. Mother Board

- **Pedestal Correction Circuit**

This circuit produces pedestal correction DC voltage which sets the optical black(OB) level of prevideo signal to fixed potential against the blanking level regardless of the temperature variation of CCD image sensor. IC1 and Q7 produces regulated DC voltage of approximately 6V set by VR2(PEDESTAL 2) and supplied through thermo-detection resistor R101, R102 on the Sensor board to collector of Q3-1 in the pedestal compensation circuit consisting of Q1 - Q3 and Q6 on the Mother board. The pedestal compensation circuit sends the DC voltage corresponding to detected temperature to OB clamp circuit in IC3 on the Process board for setting the pedestal level.

When temperature of CCD image sensor increases for example, pedestal level of prevideo signal also increases. At this time, resistance of thermo-detecting resistor R101 and R102 increase and pedestal control DC level obtained at pin1 of Q3-1 is decreased since constant current circuit consisting of Q1 and Q3-1 is connected thermo-detecting resistance. This DC level is supplied through buffer Q2 and Q6 to OB clamp circuit to decrease the pedestal level.

When temperature of CCD image sensor decreases, reverse operation takes place. In this way pedestal level is kept constant.

This circuit functions when the temperature of CCD increases more than specified temperature and VR1(PEDESTAL 1) sets the threshold of the circuit.

7. Power Board

(For WV-BL200)

This board produces regulated +12V DC power and Line-lock pulse.

- **+12V Regulator**

When the power switch is turned ON, 220V or 240V AC is rectified by D1, DC appears at cathodes side of D1 and motive current for switching transistor Q01 in IC1 is fed through R1 and R01 in IC1 turning Q01 ON. As a result, the voltage is applied to the primary winding (connecting between pins 1 and 2) of PT1 and the bias voltage V_B is generated at the bias coil (connecting between pins 3 and 4) of PT1 due to induction. This bias voltage is positively fed back through D02 in IC1 to base of Q01 for turning it ON and $V_I - V_{CE}$ (voltage between pins 1 and 4 of PT1 - voltage between collector and emitter of Q01) voltage appears at primary winding (connecting between pins 5 and 8) of PT1 because D3 is turned OFF due to reverse direction of the current from secondary winding. Therefore, the current fed to the primary winding of PT1 is charged in PT1 as the collector current of Q01 Ic increases. When the current Ic extremely increases, voltage V_{CE} increases and the voltage at the primary winding decreases. As a result, the bias voltage at the bias coil, made by induction from the primary winding also decreases, and the bias voltage which is positively bed back to switching transistor Q01 turns Q01 OFF when the bias voltage becomes less than its threshold voltage.

When Q01 turns OFF, the direction of current flows through the secondary winding of PT1 is reversed turning ON D3 and energy charged in PT1 is sent out to circuit. After completely discharging energy, the voltage at the respective winding of PT1 becomes zero.

However switching transistor Q01 starts turning ON again by the motive current through R1 and R01. In this way, Q01 repeats turning ON and OFF.

The induced voltage obtained at the secondary winding of PT1 is rectified by D3 and the rectified DC voltage is supplied to DC/DC board through the Mother board.

The rectified DC voltage is routed through photo-coupler CP1 to base of Q02 in IC1 to control the base bias of Q01.

IC2 produces reference DC voltage for detecting error DC voltage of output DC voltage by photo-coupler.

If the output DC voltage is increased for example, base current and collector current of Q02 increases due to increase of the current fed to photo-coupler and the base current of Q01 decreases to shortern the turning ON interval (pulse duty) of Q01. As a result, the rectified DC voltage at cathode of D3 is kept constant. When the output DC voltage is decreased, reverse operation takes place.

• Line-Lock Pulse Generator

The 220V or 240V AC is rectified by half-wave rectifier D2 and the rectified signal drives the photo-coupler PC2 producing 50Hz line-lock pulse. This pulse is supplied to Process board through the Mother board.

(For WV-BL204)

• + 12V Regulator

When the power switch is turned ON, 24V AC is rectified by D1, DC appears at cathodes side of D1 and motive current for switching transistor Q1 is fed through R1 and turning Q1 ON. As a result, the voltage is applied to the primary winding (connecting between pins 1 and 2) of PT1 and the bias voltage V_B is generated at the bias coil (connecting between pins 3 and 4) of PT1 due to induction. This bias voltage is positively fed back through D3 to base of Q1 for turning it ON and V_I-V_{CE} (voltage between pins 1 and 4 of PT1 - voltage between collector and emitter of Q1) voltage appears at primary winding (connecting between pins 6 and 10) of PT1 because D4 is turned OFF due to reverse direction of the current from secondary winding. Therefore, the current fed to the primary winding of PT1 is charged in PT1 as the collector current of Q1 Ic increases. When the current Ic extremely increases, voltage V_{CE} increases and the voltage at the primary winding decreases. As a result, the bias voltage at the bias coil, made by induction from the primary winding also decreases, and the bias voltage which is positively fed back to switching transistor Q1 turns Q1 OFF when the bias voltage becomes less than its threshold voltage.

When Q1 turns OFF, the direction of current flows through the secondary winding of PT1 is reversed turning D4 ON and energy charged in PT1 is sent out to circuit. After completely discharging energy, the voltage at the respective winding of PT1 becomes zero.

However switching transistor Q1 starts turning ON again by the motive current through R1. In this way, Q1 repeats turning ON and OFF.

The induced voltage obtained at the secondary winding of PT1 is rectified by D4 and the rectified DC voltage is supplied to DC/DC board through the Mother board.

The rectified DC voltage is routed through photo-coupler CP1 to base of Q2 to control the base bias of Q1.

IC1 produces reference DC voltage for detecting error DC voltage of output DC voltage by photo-coupler.

If the output DC voltage is increased for example, base current and collector current of Q2 increases due to increase of the current fed to photo-coupler and the base current of Q1 decrease to shortern the turning ON interval (pulse duty) of Q1. As a result, the rectified DC voltage at cathode of D4 is kept constant. When the output DC voltage is decreased, reverse operation takes place.

• Line-Lock Pulse Generator

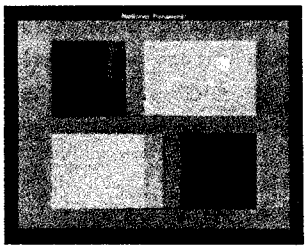
The 24V AC is supplied to photo-coupler PC2 and PC2 generates 50Hz line-lock pulse. This pulse is supplied to Process board through the Mother board.

ADJUSTMENT PROCEDURE

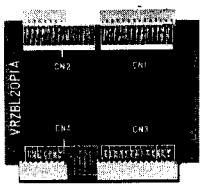
1. Test Equipment Required

The following test equipment is required for adjusting CCTV camera WV-BL200/WV-BL202/WV-BL204.

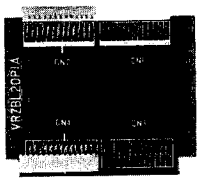
- Oscilloscope (50MHz band width, dual trace, delayed with three probes)
- Digital voltmeter
- Frequency counter
- Underscanned video monitor
- Sync signal generator
- Lens : Automatic iris control lens such as WV-LA12 or Manual iris lens (F1.4 16mm)
- Lighting (140 footcandles (1400 lux) 3200°K)
- Lightmeter
- Logarithmic gray scale chart (Part No. YWV2310RB99)



- Extention boards (Part No . YWV0EA0059AN)
  (Part No.YWV0EA0060AN)



YWV0EA0059AN
(For Process board)



YWV0EA0060AN
(For Drive and DC/DC board)

2. Disassembling Procedure for Adjustment

- Remove two screws fixing camera mounting and remove the mounting. (Fig. 2-1)

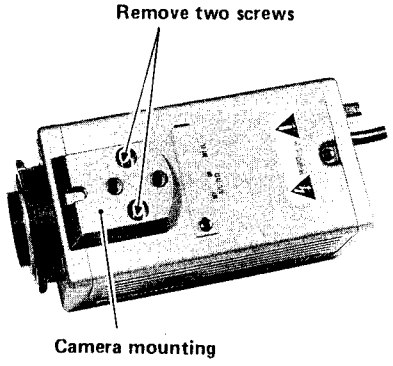


Fig. 2-1

- Remove six screws fixing upper cover and remove the cover by pulling it upward. (Fig. 2-2)

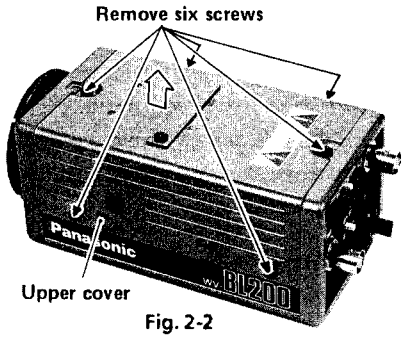


Fig. 2-2

- Remove two screws holding bottom cover and remove the cover by pulling it downward. (Fig. 2-3)

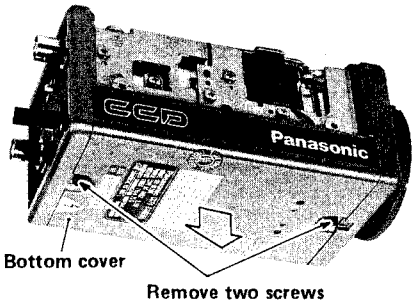


Fig. 2-3

- Remove two screws fixing PCB holder and remove the holder. (Fig. 2-4)

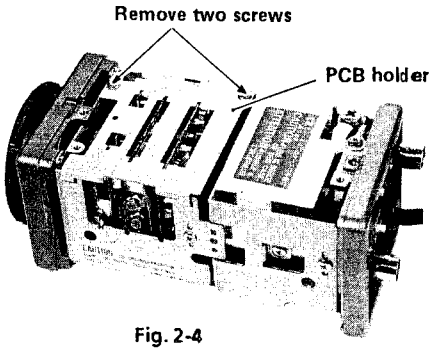


Fig. 2-4

- Remove respective PCB assembly by pulling it upward and replace the PCB assembly using the extention board. (Fig. 2-5)

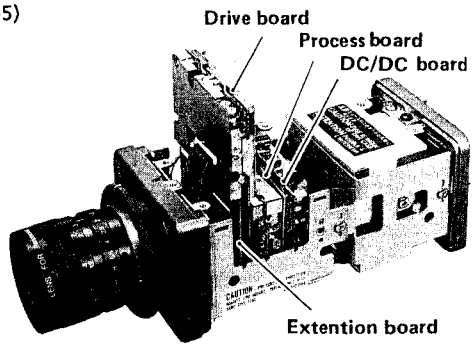


Fig. 2-5

3. CCD Image Sensor Replacement

- Remove upper cover, bottom cover and PCB holder previously while refferring to the "2. Disassembling Procedure for Adjustment" on page 16.
- Remove Drive board, Process board and DC/DC board from Mother board by pulling them upward.
- Disconnect CN5, CN6 and CN7 from the Mother board and remove two screws holding power supply unit mounting angle. (Fig. 3-1)

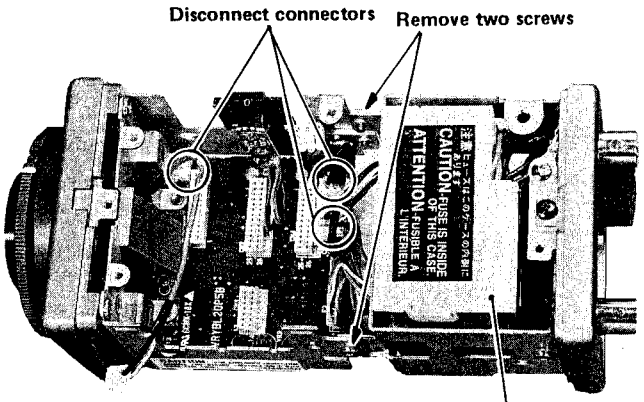


Fig. 3-1

- Remove four screws fixing Mother board and remove Mother board. (Fig. 3-2)

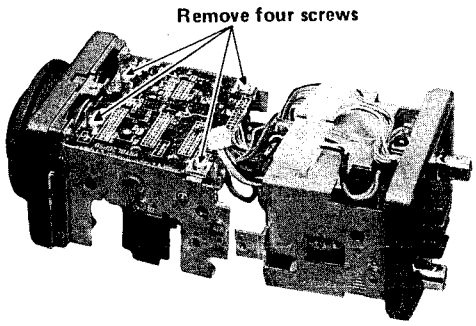


Fig. 3-2

- Remove four screws fixing front chassis assembly and remove front chassis assembly. (Fig. 3-3)

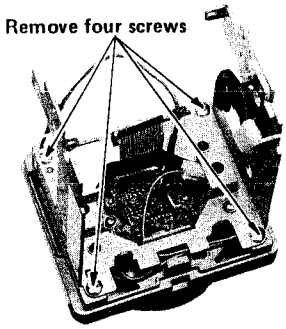


Fig. 3-3

- Unsolder the CCD pins and remove CCD image sensor from CCD board. (Fig. 3-4)

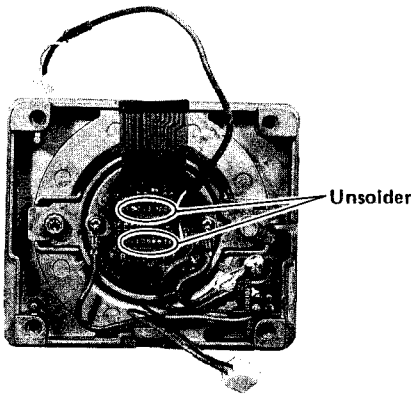
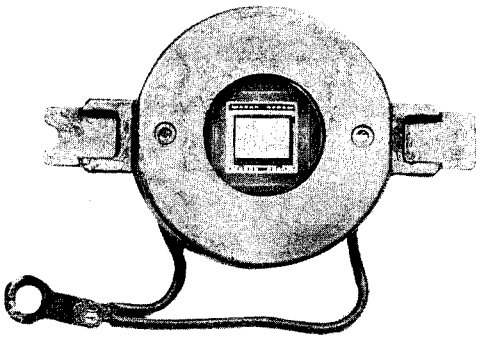


Fig. 3-4

- Reinstall the new CCD image sensor assembly to the CCD board. (Fig. 3-5)

  Note : When CCD image sensor assembly is replaced, make sure that the thermo-detection resistors (R101 and R102 on the CCD board) which supplied with sensor assembly are also replaced.



CCD assembly

Fig. 3-5

- After replacing the CCD image sensor assembly, reinstall the camera in reverse procedure of disassembling.

4. Connection and Setting Up for Adjustment

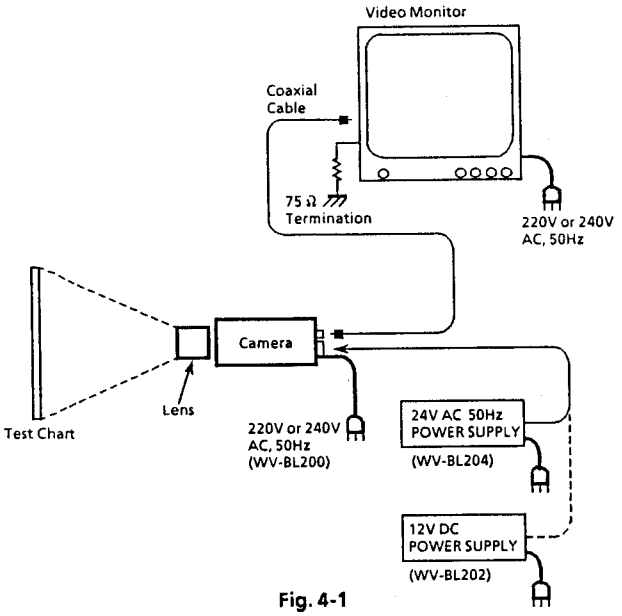


Fig. 4-1

Connection

- Connect the coaxial cable between video output connector and underscanned black and white video monitor.
- Terminate video input of the monitor with 75 ohms.
- Position the logarithmic grayscale chart in front of camera as shown in Fig. 4-1.

Setup

- Set respective switches on the camera as follows.

AGC ON/OFF Switch	ON position
Lens Selection Switch	DC position
Gen-lock Termination Switch	OFF position
Sync Selection Switch ..... (WV-BL200 and WV-BL204)	INT position
Field/Frame Selection Switch ..... (Sync board)	Field position

5. Adjustment Procedure

- Refer to page 22 for the position of test points and adjusting controls.

(1) +9.2V adjustment

Test point :	*TP10 (+9.2V)*	*Process board*
Adjust :	*VR1 (+9.2V ADJ)*	*DC/DC board*

- Connect the digital voltmeter to TP10 on the Process board.
- Adjust VR1 (+9.2V ADJ) for 9.2V ± 0.05V.

(2) VOG adjustment

Test point :	*TP2 (VOG)*	*Drive board*
Adjust :	*VR2 (VOG ADJ)*	*Drive board*

- Connect the digital voltmeter to TP2 on the Drive board.
- Adjust VR2 (VOG ADJ) for 4.0V ± 0.1V.

(3) VCO adjustment

Test point :	*TP3 (VCO)*	*Drive board*
Adjust :	*L2 (VCO ADJ)*	*Drive board*

- Connect the digital voltmeter to TP3 on the Drive board.
- Adjust L2 (VCO ADJ) for 2.2V ± 0.1V.

(4) INT 17MHz adjustment

Test point :	*TP8 (17MHz)*	*Process board*
Adjust :	*CT1 (17MHz ADJ)*	*Process board*

- Connect the frequency counter to TP8 on the Process board.
- Adjust CT1 (17MHz ADJ) for 17.734476MHz ± 10Hz.

(5) Flangeback adjustment

Adjust : *Flangeback adjusting ring*

- Aim the camera at dark object further than 10m.
- Set the lens focus to infinity (∞) position.
- Loosen the holding screws on the flangeback adjusting ring.
- Rotate flangeback adjusting ring for best focus.
- Set distance between camera and object to 0.6m and lens focus ring to 0.6m position.
- Confirm that picture is in-focus. If not, re-adjust flangeback adjusting ring for best focus.
- Repeat above procedure until the focus tracks throughout the lens focus. (Fig. 5-1)
- Tighting the holding screws.

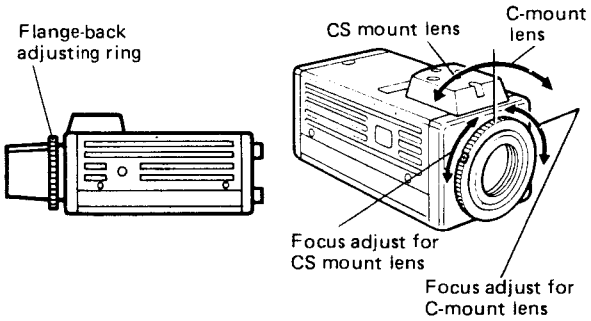


Fig. 5-1

(6) VOFD adjustment

Test point :	*S terminal*	*Process Sub board*
Adjust :	*VR1 (VOFD ADJ)*	*Drive board*

- Aim the camera at white chart or white paper.
- Set VR8 (ALC 2) on the Process board to fully clockwise position for fully opening the lens iris when automatic iris lens is used or set the lens iris to F1.4 position when manual iris lens is used.
- Connect the oscilloscope to S (signal) terminal on the Process Sub board.
- Set the oscilloscope at H.rate.
- Adjust VR1 (VOFD ADJ) on the Drive board so that the white signal level becomes 0.8V ± 0.02V. (Fig. 5-2)
- Reset VR8 (ALC 2) to its mechanical center position.

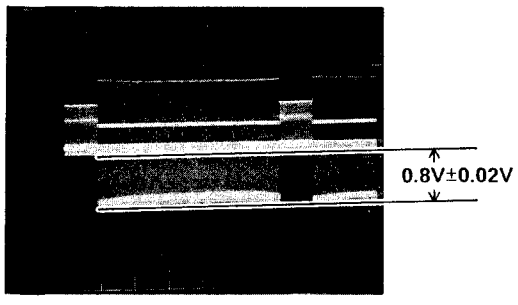


Fig. 5-2

(7) Pedestal adjustment

Test points :	*TP3 (Y)*	*Process board*
	TP1 (OB1)	*Mother board*
	TP2 (OB2)	*Mother board*
Adjusts :	*VR1 (PEDESTAL 1)*	*Mother board*
	VR2 (PEDESTAL 2)	*Mother board*

- Cap on the lens.
- Connect the oscilloscope to TP3 (Y) on the Process board.
- Trigger the oscilloscope at H rate.
- Adjust VR2 (PEDESTAL 2) on the Mother board so that the pedestal lelvel is 0 ± 5mV. (Fig. 5-3)

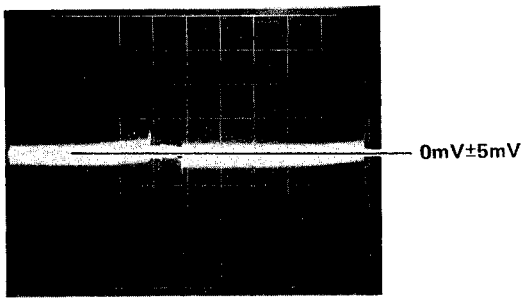


Fig. 5-3

- Connect the (+) probe of digital voltmeter to TP1 and (−) probe to TP2 on the Mother board.
- Adjust VR1 (PEDESTAL1) so that the voltage between TP1 and TP2 is 200mV ± 10mV.
- Repeat adjusting VR1 and VR2 so that the pedestal level is 0 ± 5mV and voltage between TP1 and TP2 is 200mV ± 10mV.

(8) ALC adjustment

Test pint :	*TP2 (PREVIDEO)*	*Process board*
Adjust :	*VR5 (ALC 1)*	*Process board*

- Aim the camera at logarithmic gray scale chart.
- Connect the oscilloscope to TP2 on the Process board.
- Trigger the oscilloscope at H rate.
- Confirm that the VR8 (ALC 2) on the Process board is set to its mechanical center position.
- Adjust VR5 (ALC 1) so that the signal level at TP2 becomes 0.25V ± 0.01V. (Fig.5-4)

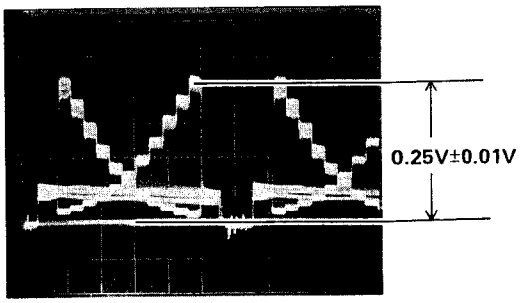


Fig. 5-4

(9) Gain adjustment

Test point :	*TP3 (Y)*	*Process board*
Adjusts :	*VR3 (AGC SET)*	*Process board*
	VR2 (GAIN SET)	*Process board*

- Aim the camera at logarithmic gray scale chart.
- Connect the oscilloscope to TP3 on the Process board.
- Trigger the oscilloscope at H rate.
- Set the AGC ON/OFF switch to ON position.
- Adjust VR3 (AGC SET) so that the signal level becomes 0.8V ± 0.02V. (Fig. 5-5)
- Set the AGC ON/OFF switch to OFF position.
- Adjust VR2 (GAIN SET) so that the signal level becomes 0.8V ± 0.02V. (Fig. 5-5)
- Reset the AGC ON/OFF switch to ON position.

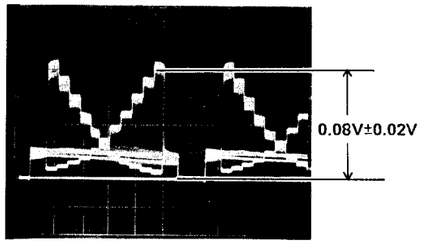


Fig. 5-5

(10) Video level adjustment

Test point :	*VIDEO OUT connector*	
Adjust :	*VR4 (Y LEVEL)*	*Process board*

- Aim the camera at logarithmic gray scale chart.
- Connect the oscilloscope to VIDEO OUT connector terminated with 75 ohms resister.
- Trigger the oscilloscope at H rate.
- Adjust VR4 (Y LEVEL) so that the video level becomes 0.7V ± 0.03V. (Fig.5-6)
- Confirm that signal level is not changed when AGC ON/OFF switch is switched ON and OFF. If not, readjust VR3 and VR2 on the Process board while referring to (9) Gain adjustment.

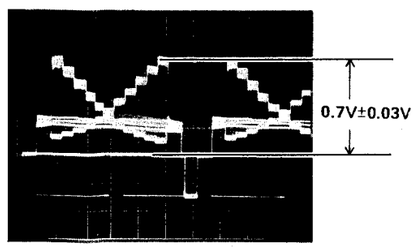


Fig.5-6

(11) EXT VCO adjustment

Test point :	*TP9 (EXT VCO)*	*Process board*
Adjust :	*L7 (EXT VCO ADJ)*	*Process board*

- Supply composite video signal or sync signal to GEN-LOCK connector of camera from signal generator.
- Set the Gen-lock Termination Switch to ON (75 ohms) position.
- Connect the digital voltmeter to TP9 on the Process board.
- Confirm that Sync Selection Switch is set to INT position for WV-BL200 and WV-BL204.
- Adjust L7 (EXT VCO ADJ) for 2.2V ± 0.1V.

(12) H phase adjustment

Test points :	*VIDEO OUT connector*	
	TP6 (GEN-LOCK)	*Process board*
Adjust :	*VR7 (H PHASE)*	*Process board*

- Supply composite video signal or sync signal to GEN-LOCK connector of camera from sync signal generator.
- Set the Gen-lock Termination Switch to ON position.
- Connect channel 1 probe of oscilloscope to VIDEO OUT connector of camera terminated with 75 ohms and channel 2 probe to TP6 on the Process board.
- Trigger the oscilloscope at H rate using TP6 (GEN-LOCK) on the Process board.
- Expand H blanking period of oscilloscope using delayed sweep mode of oscilloscope.
- Adjust VR7 (H PHASE) so that both sync signal are coincided. (Fig. 5-7)

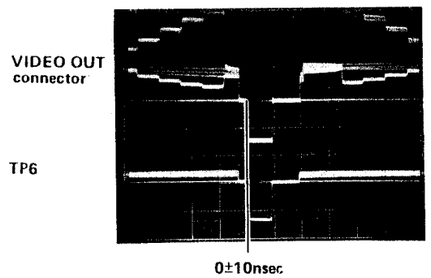


Fig. 5-7

(13) Line-lock phase adjustment (WV-BL200 and WV-BL204 only)

Test points :	*VIDEO OUT connector*	
	AC Input terminal	
Adjust :	*VR3 (LINE- LOCK PHASE)*	*Mother board*

- Disconnect the composite video or sync signal from the GEN-LOCK connector.
- Set the Sync Selection Switch to LL position.
- Connect the channel 1 probe of oscilloscope to VIDEO OUT connector of camera, terminated with 75 ohms.
- Connect channel 2 probe of oscilloscope to live side of AC power source.
- Trigger the oscilloscope at V rate.
- Adjust VR3 (LINE LOCK) so that decay point of V sync signal delays 2H ± 1H from zero cross point of AC power source. (Fig. 5-8)

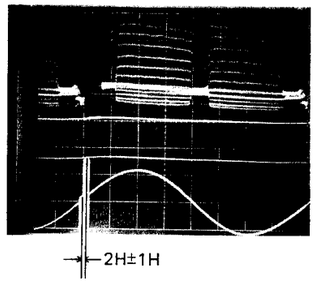


Fig. 5-8

(13) Line-lock phase adjustment (WV-BL200 and WV-BL204 only)

Test points : *VIDEO OUT connector*
AC Input terminal
Adjust : *VR3 (LINE- LOCK PHASE)* *Mother board*

- Disconnect the composite video or sync signal from the GEN-LOCK connector.
- Set the Sync Selection Switch to LL position.
- Connect the channel 1 probe of oscilloscope to VIDEO OUT connector of camera, terminated with 75 ohms.
- Connect channel 2 probe of oscilloscope to live side of AC power source.
- Trigger the oscilloscope at V rate.
- Adjust VR3 (LINE LOCK) so that decay point of V sync signal delays 2H ± 1H from zero cross point of AC power source. (Fig. 5-8)

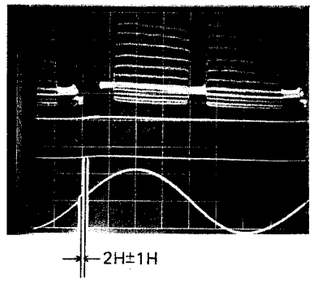
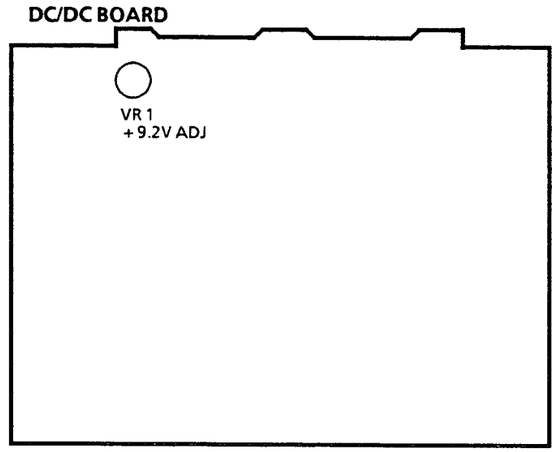
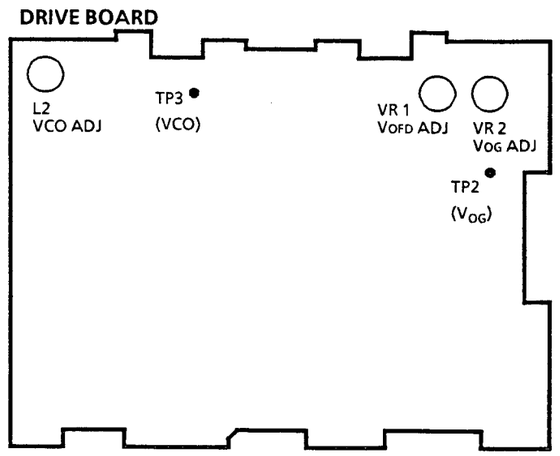
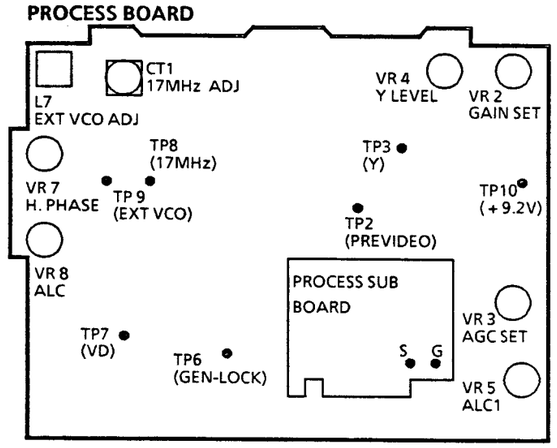


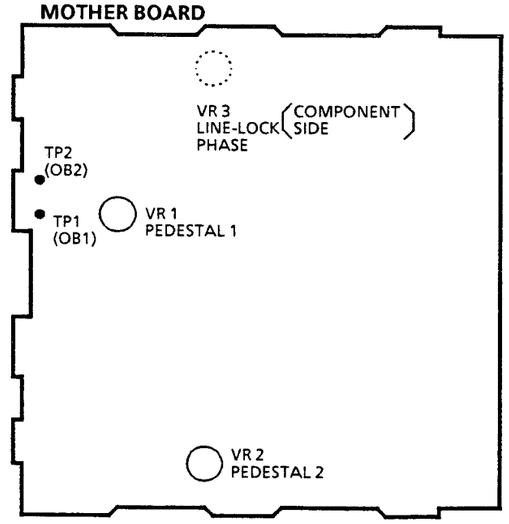
Fig. 5-8

LOCATION OF TEST POINTS AND ADJUSTING CONTROLS









CHIP COMPONENTS

1. Chip Transistor

The transistor number is indicated on the top surface of the chip transistor using two alphabet letters or one numerical and two alphabet letters.

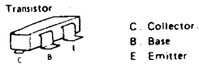
Transistor Number

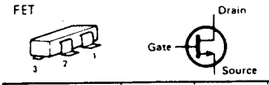
Letter	Transistor No.	Letter	Transistor No.
A	2SB709	X	2SD602A
B	2SB709A	Y	2SD601
C	2SB710	Z	2SD601A
D	2SB710A	1Z	2SD1030
E	2SA1022	1N	2SK199
F	2SA1034	1O	2SK198
H	2SA1035	1A	2SB799
I	2SB792	1B	2SB814
K	2SC2778	1C	2SB902
P	2SD814	1F	2SK321
Q	2SD813	1L	2SK247
R	2SC2480	1K	2SK316
S	2SC2405	1M	2SJ84
T	2SC2406	1T	2SC3077
U	2SC2404	1X	2SC2845
V	2SC2295	2B	2SK374
W	2SD602	2C	2SK116

Example

WQ ⟶ 2SD602 – Q
YQ ⟶ 2SD601 – Q
1BS ⟶ 2SB814 – S

Appearance and Symbols

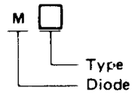




	1	2	3
Except 2SK199	Drain	Source	Gate
2SK199	Gate	Drain	Source

2. Chip Diode

The diode number is indicated on the top surface of the chip diode using Two alphabet letters.



Diode Number

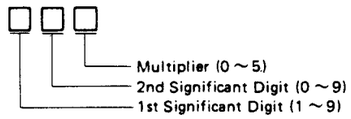
Letter	Diode No.	Letter	Diode No.
MA	MA151A	MI	MA152K
MB	MA152A	MK	MA28W-B
MC	MA153	ML	MA28T-A
MD	MA28-A	MN	MA151WA
ME	MA28-B	MO	MA152WA
MF	MA28W-A	MT	MA151WK
MH	MA151K	MU	MA152WK

Appearance and Symbols

	1	2	3
MA28/28W/28T	–	Anode	Cathode
MA151K/152K	–	Anode	Cathode
MA151A/152A	–	Cathode	Anode
MA151WK/MA152WK	Anode	Anode	Cathode
MA151WA/MA152WA	Cathode	Cathode	Anode
MA153	Cathode	Anode	Common

3. Chip Resistor

The resistor value is indicated on the bottom surface of the chip resistor using three digit numbers.



EXAMPLE:

330 ⟶ 33×10^0 = 33 ohms
561 ⟶ 56×10^1 = 560 ohms
123 ⟶ 12×10^3 = 12 kohms

Note: Zero ohm resistor (jumper chip) is colored red or green.

4. Chip Capacitor

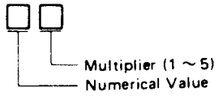
The capacitive value of replacement chip capacitors is indicated on the bottom surface. Original parts do not have value indication.

If the capacitive value is less than 100 pF, the value will be indicated by one or two digit number expressing the capacity directly in pF.

EXAMPLE:

0.5 ⟶ 0.5 pF 2.5 ⟶ 2.5 pF
75 ⟶ 0.75 pF 33 ⟶ 33 pF
1 ⟶ 1 pF 82 ⟶ 82 pF

If the capacitive value is 100 pF or greater, the value will be indicated by an alpha-numeric code. The letter precedes the number and expresses a numerical value to be multiplied by the number which follows.



Numerical Value

Letter	Value	Letter	Value
A	10	N	33
B	11	P	36
C	12	Q	39
D	13	R	43
E	15	S	47
F	16	T	51
G	18	U	56
H	20	V	62
J	22	W	68
K	24	X	75
L	27	Y	82
M	30	Z	91

* Letters I and O are not used

EXAMPLE:

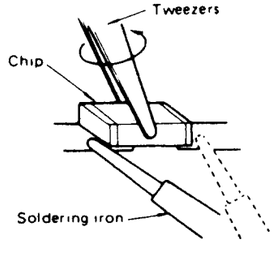
A1 ⟶ 10×10^1 = 100 pF
N2 ⟶ 33×10^2 = 3300 pF
S3 ⟶ 47×10^3 = 47000 pF

5. Precautions in replacing the chip component

1. Make sure that the unit is turned OFF when replacing the chip.
2. Use tweezers to prevent any damage to the chip surface.
3. Do not re-use the chips after removal.
4. Do not rub the electrode of chips.
5. Do not subject the chips to excessive stress.
6. It is recommended that a pencil-type soldering iron to be used.
7. The solder whose diameter is less than 0.5 mm is recommended.
8. Do not heat the chip beyond 3 seconds.
9. Maintain temperature control under 260°C (500°F) when soldering.

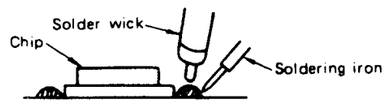
5-1 Removal (Transistor, Diode, Resistor and Capacitor)

1. Add the solder to both ends of the chip (three leads for chip transistor).
2. While attaching the soldering iron to both ends of the chip (three leads for chip transistor) as shown below, remove the chip by turning it with tweezers.
   Note: Be careful not to damage other chips.

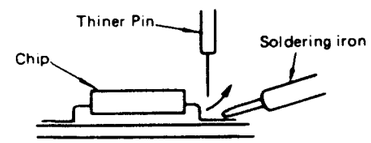


5-2 Removal (IC)

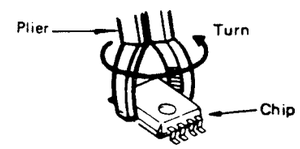
1. Add the solder wick and solder iron to each lead of the IC and remove solder.



2. Add the solder iron to each lead of the IC and left each lead of the IC using thiner pin.

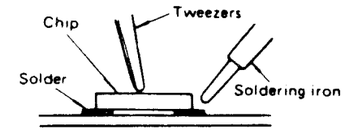


3. Remove IC turning it with plier.

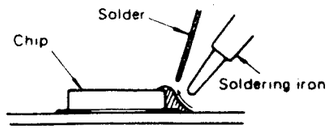


5-3 Mounting

1. Place the solder thinly on the chip mounting foil.
2. Solder the chip temporarily while holding the chip with the tweezers.



3. Solder both ends of chip (three leads for chip transistor).



Numerical Value

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L	27	Y	82
M	30	Z	91

* Letters I and O are not used

EXAMPLE:

A1 ⟶ $10 \times 10^1 = 100$ pF

N2 ⟶ $33 \times 10^2 = 3300$ pF

S3 ⟶ $47 \times 10^3 = 47000$ pF

5. Precautions in replacing the chip component

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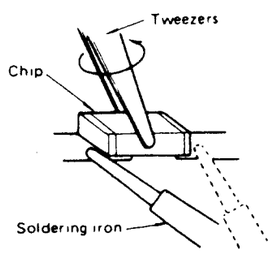
8. Do not heat the chip beyond 3 seconds.
9. Maintain temperature control under 260°C (500°F) when soldering.

5-1 Removal (Transistor, Diode, Resistor and Capacitor)

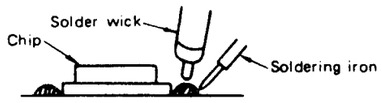
1. Add the solder to both ends of the chip (three leads for chip transistor).
2. While attaching the soldering iron to both ends of the chip (three leads for chip transistor) as shown below, remove the chip by turning it with tweezers.

Note Be careful not to damage other chips.

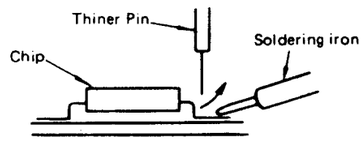


5-2 Removal (IC)

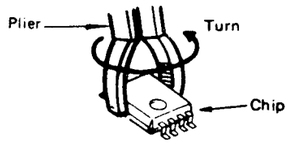
1. Add the solder wick and solder iron to each lead of the IC and remove solder.



2. Add the solder iron to each lead of the IC and left each lead of the IC using thiner pin.

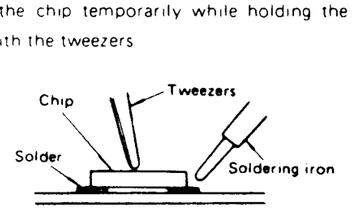


3. Remove IC turning it with plier.

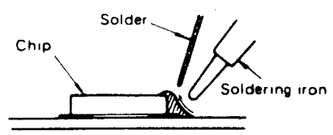


5-3 Mounting

1. Place the solder thinly on the chip mounting foil.
2. Solder the chip temporarily while holding the chip with the tweezers.



3. Solder both ends of chip (three leads for chip transistor).



APEARANCE OF IC, TRANSISTOR AND DIODE

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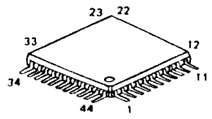
YWTC6013U
AN2050FB
YWPD65012GB



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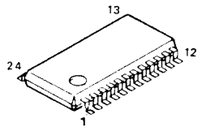

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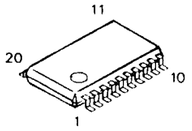

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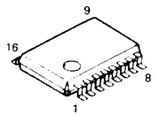

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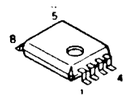

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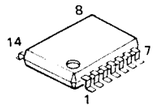
MN74HCU04S



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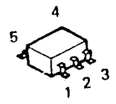

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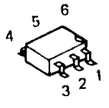

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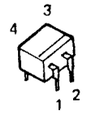

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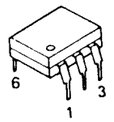

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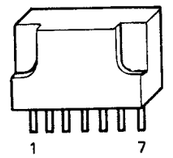

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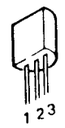

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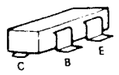
2SD1819-QRS
2SD601-RS
2SB709-QRS
2SC3931-CD
2SD1820-QRS
2SC3303-0Y



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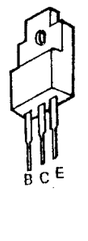

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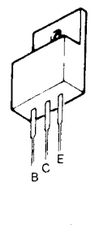

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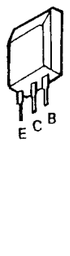
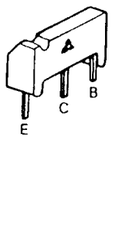


2SB793-RS
2SD973-QRS



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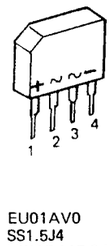

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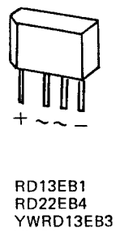
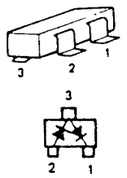


MA153



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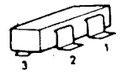
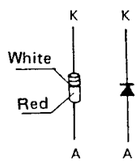


1 : Drain
2 : Source
3 : Gate

MA170



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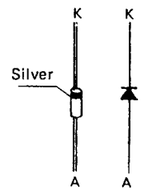

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RD22EB4
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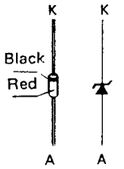
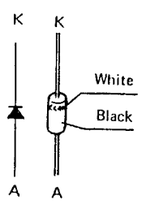
YWRD4.3EB1



ERB44-02



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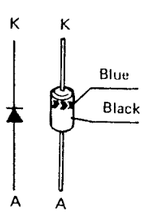
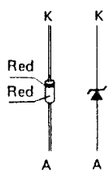


1SS55



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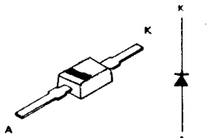
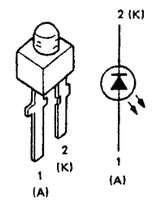
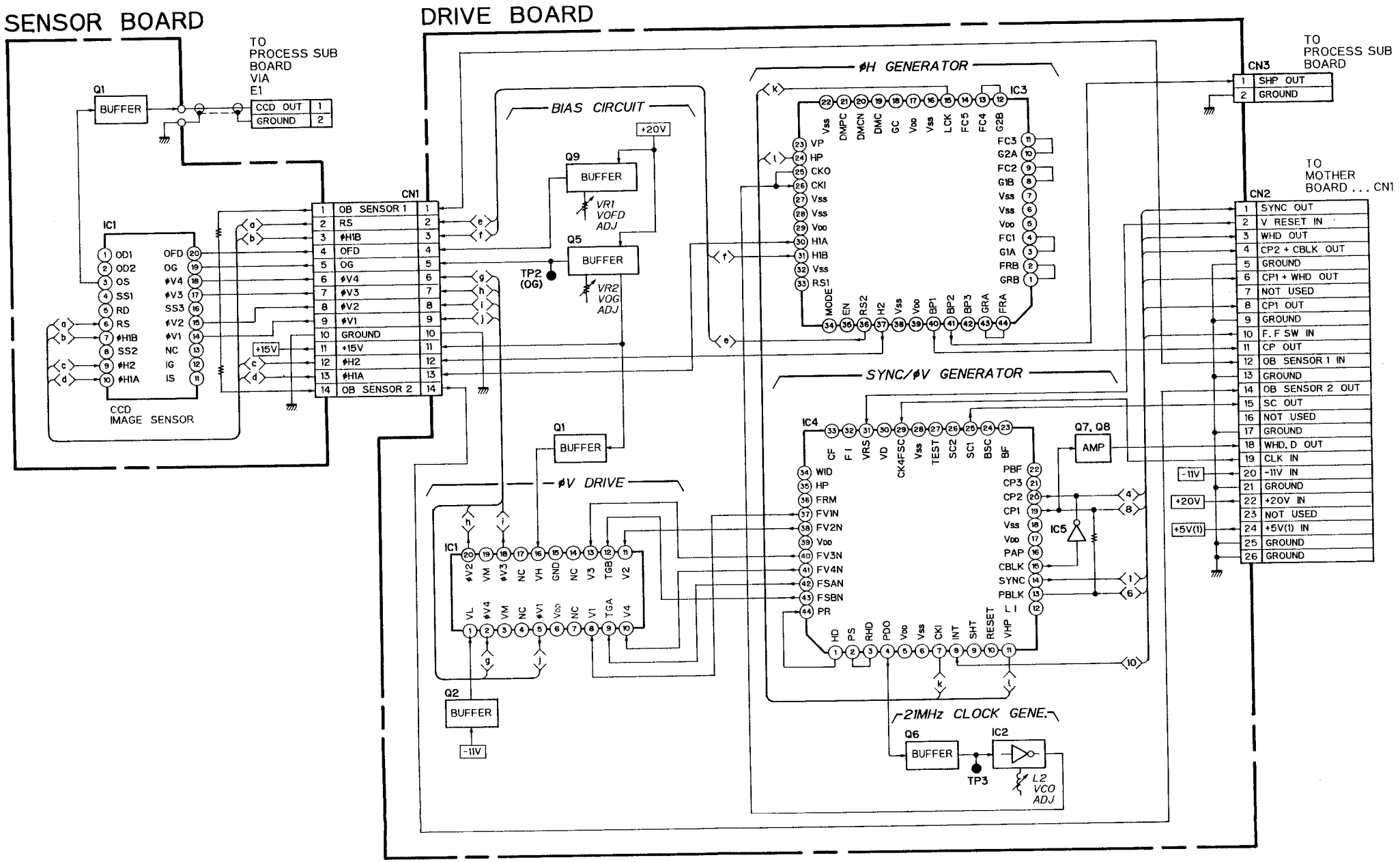


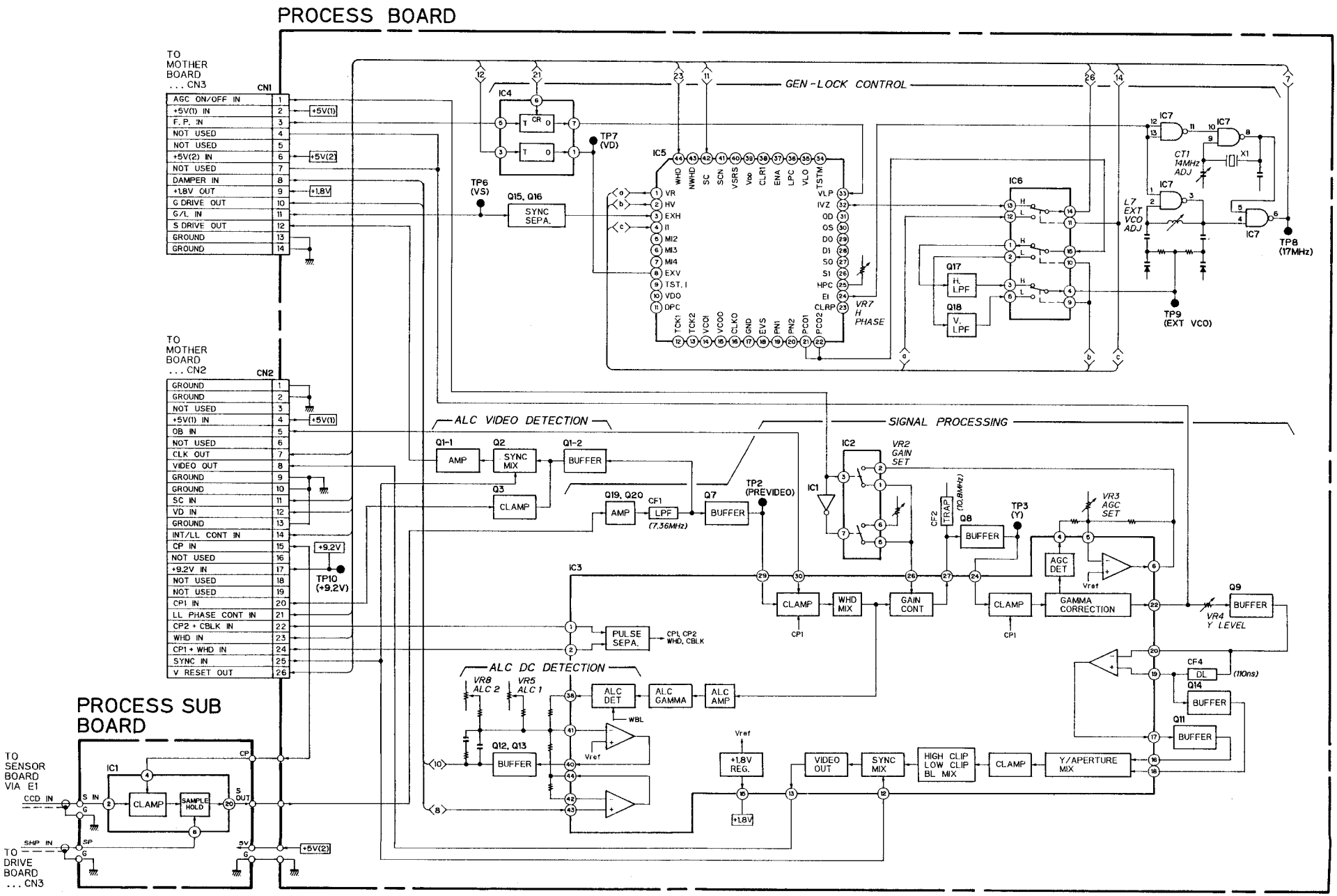
LN238RPH



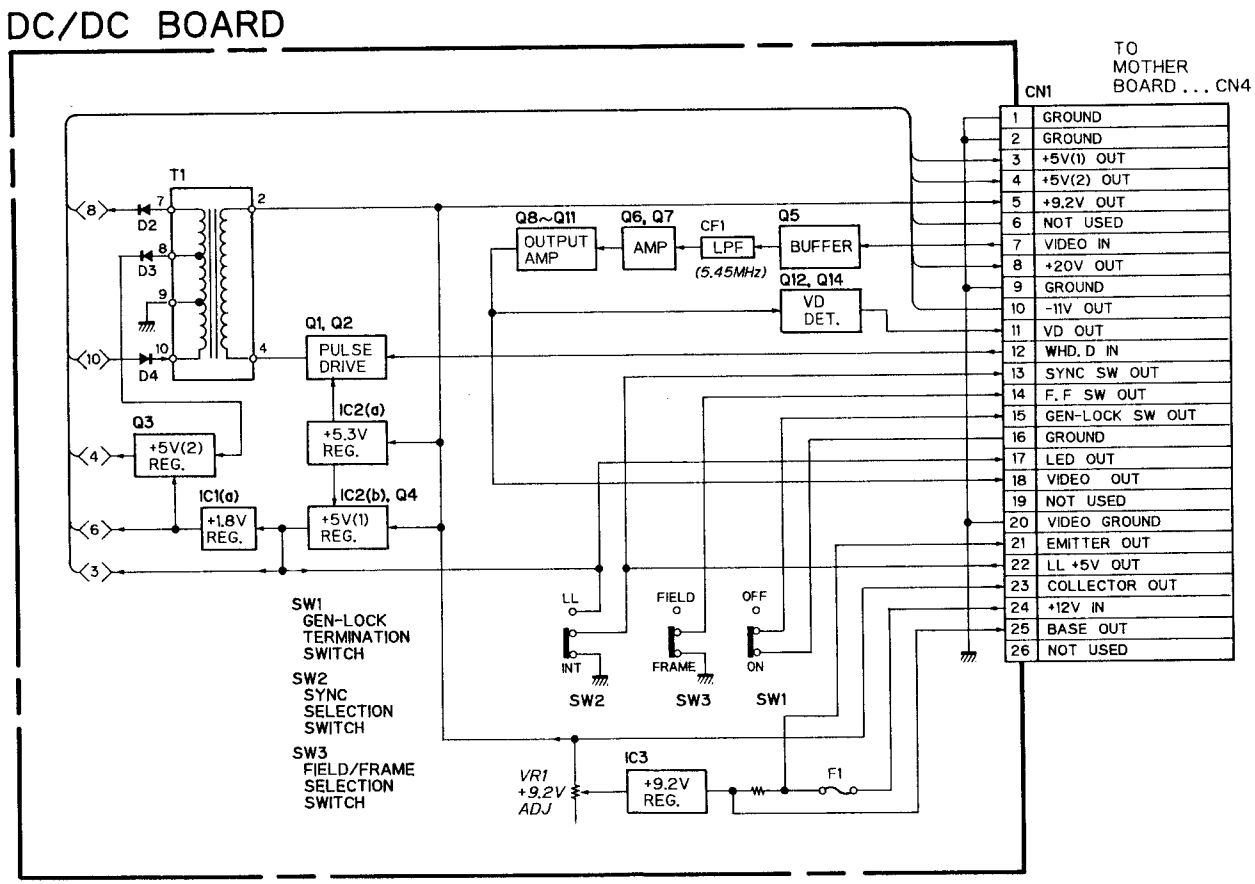
BLOCK DIAGRAM OF SENSOR BOARD, DRIVE BOARD



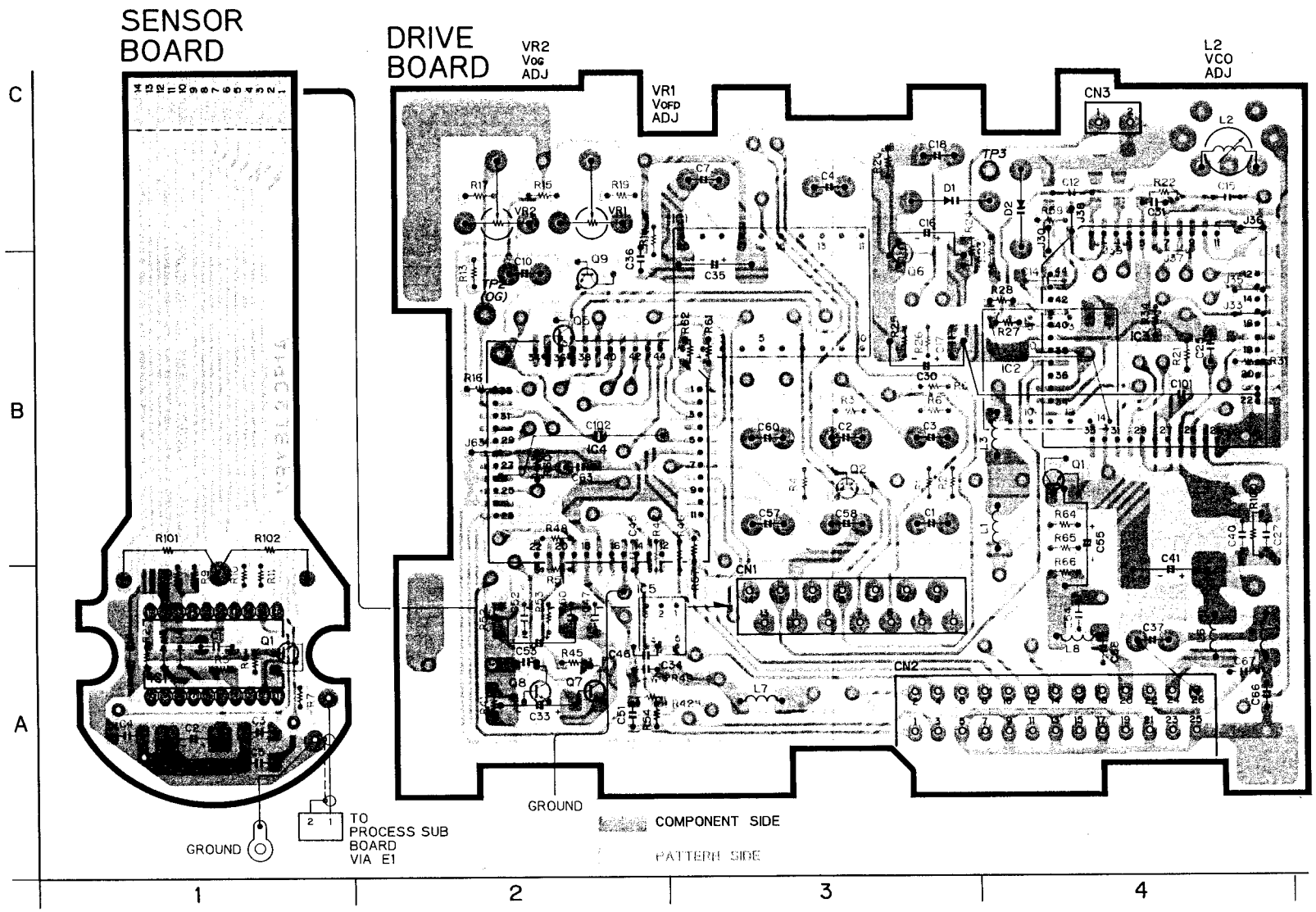
BLOCK DIAGRAM OF PROCESS BOARD

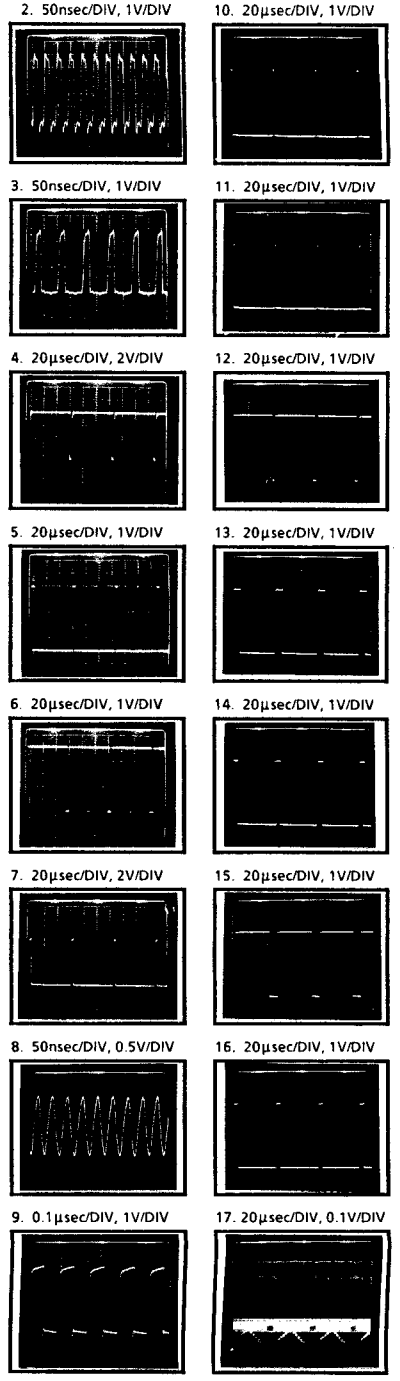


BLOCK DIAGRAM OF DC/DC BOARD



CONDUCTOR VIEW OF SENSOR BOARD, DRIVE BOARD



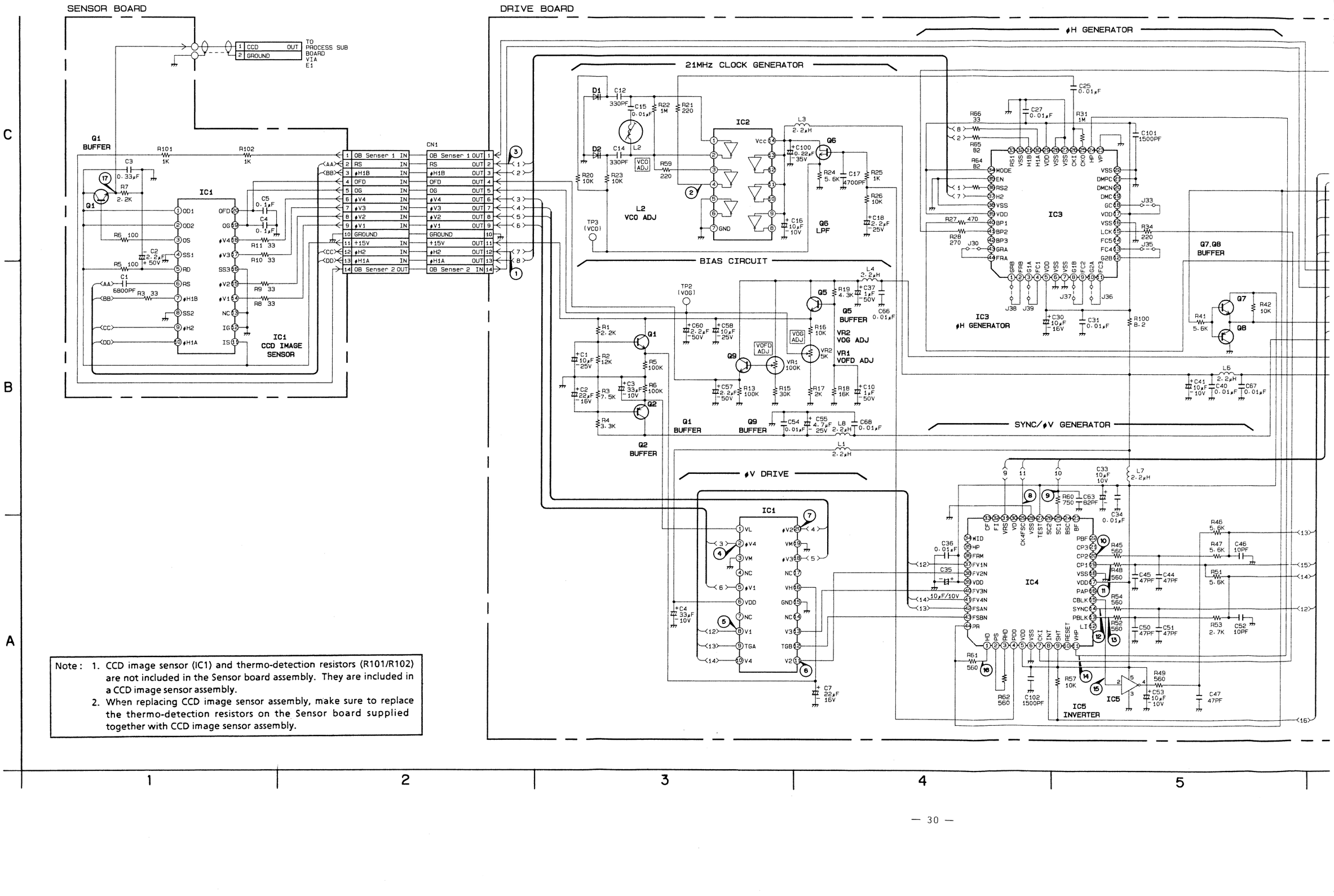


<ADDRESS INFORMATION>

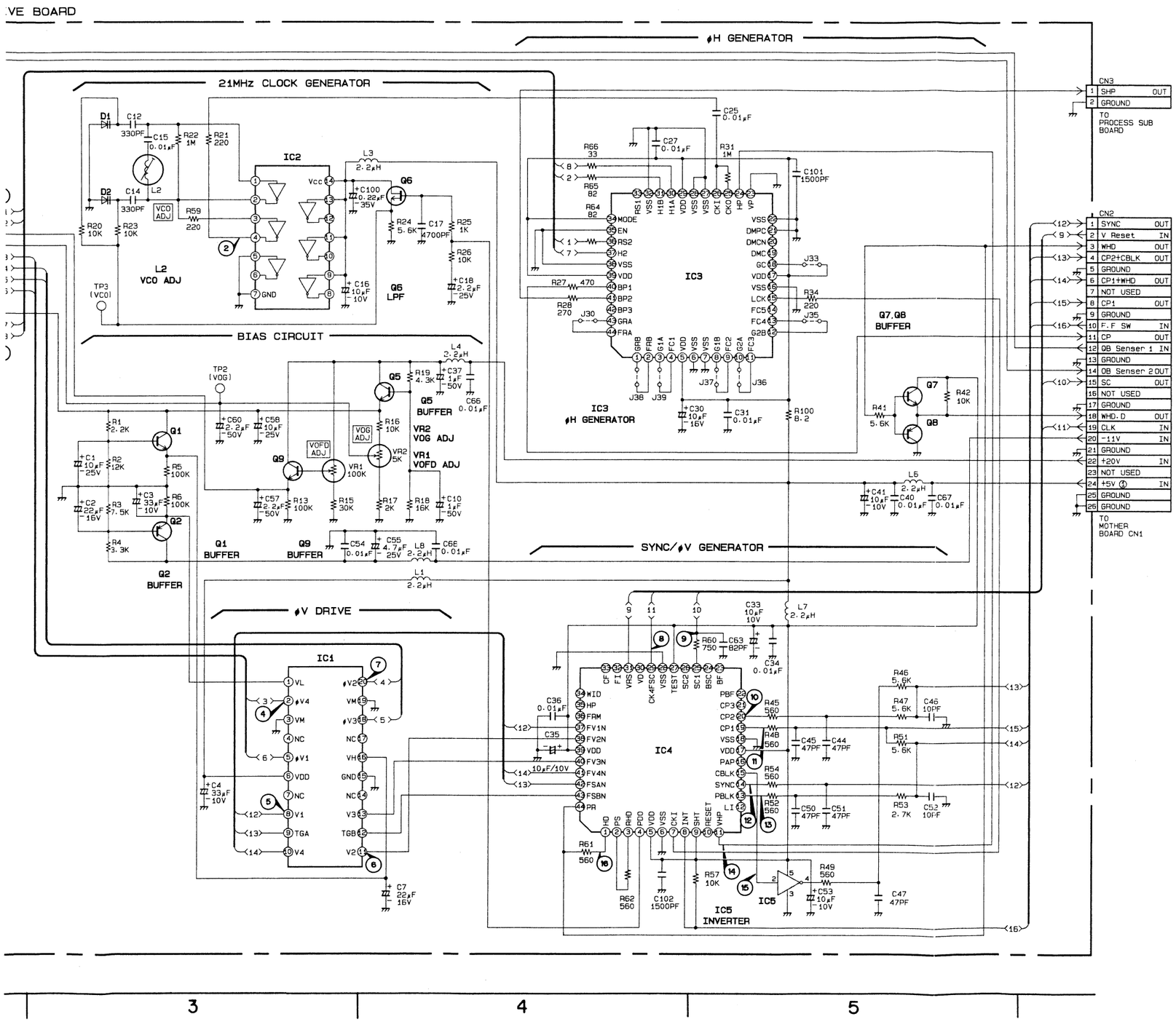
SENSOR BOARD		DRIVE BOARD					
IC1	A1	IC1	B3,C3	IC5	A2,A3	Q7	A2
Q1	A1	IC2	B4	Q1	B4	Q8	A2
		IC3	B4,C4	Q2	B3	Q9	B2
		IC4	B2,B3	Q5	B2	D1	C3
				Q6	B3,C3	D2	C4

Note: 1. CCD image sensor (IC1) and thermo-detection resistors (R101/R102) are not included in the Sensor board assembly. They are included in a CCD image sensor assembly.
2. When replacing CCD image sensor assembly, make sure to replace the thermo-detection resistors on the Sensor board supplied together with CCD image sensor assembly.

SCHEMATIC DIAGRAM OF SENSOR BOARD, DRIVE BOARD


SENSOR BOARD
DRIVE BOARD
TO PROCESS SUB BOARD VIA E1
CCD OUT
GROUND
CN1
IC1 CCD IMAGE SENSOR
Q1 BUFFER
21MHz CLOCK GENERATOR
IC2
L2 VCO ADJ
Q6 LPF
BIAS CIRCUIT
Q5 BUFFER
VR2 VOG ADJ
VR1 VOFD ADJ
Q1 BUFFER
Q9 BUFFER
Q2 BUFFER
φH GENERATOR
IC3 φH GENERATOR
Q7,Q8 BUFFER
SYNC/φV GENERATOR
φV DRIVE
IC4
IC5 INVERTER
Note : 1. CCD image sensor (IC1) and thermo-detection resistors (R101/R102) are not included in the Sensor board assembly. They are included in a CCD image sensor assembly.
2. When replacing CCD image sensor assembly, make sure to replace the thermo-detection resistors on the Sensor board supplied together with CCD image sensor assembly.

SCHEMATIC DIAGRAM OF SENSOR BOARD, DRIVE BOARD



<VOLTAGES>

Drive Board

	IC1	IC2	IC3	IC4	IC5
Pin 1	-6.9	2.3	1.6	0.5	0
2	-0.4	2.5	1.6	0.6	3.8
3	0	2.7	1.7	0.5	0
4	0	2.7	1.6	1.7	1.2
5	-0.4	0	4.6	4.9	5.0
6	5.0	5.0	0	0	
7	0	0	0	2.1	
8	0.3	0	1.6	4.9	
9	5.0	5.0	0	4.9	
10	0.3	0	1.7	4.9	
11	4.6	5.0	1.7	0.7	
12	5.0	0	1.7	2.5	
13	4.6	5.0	1.7	1.1	
14	0	5.0	1.7	4.5	
15	0		1.7	3.7	
16	12.0		0	2.5	
17	0		4.7	4.9	
18	-6.4		4.7	0	
19	0		0	0.1	
20	-6.4		4.7	0.2	
21			0	0	
22			0	0.2	
23			0	0.2	
24			1.0	4.8	
25			2.4	1.7	
26			2.2	1.7	
27			0	1.7	
28			0	0	
29			4.6	2.5	
30			2.6	0.3	
31			2.1	5.0	
32			0	2.1	
33			1.1	0	
34			4.6	4.0	
35			0	0.6	
36			1.1	0	
37			2.0	0.3	
38			0	4.6	
39			4.6	5.0	
40			0.8	4.6	
41			1.9	0.3	
42			0	4.9	
43			1.6	4.9	
44			1.6	0.5	

	B	C	E
Q1	12.4	15.0	11.8
Q2	-7.6	-11.1	-6.9
Q5	15.5	20.0	14.8
Q7	0.5	5.0	1.0
Q8	0.5	0	1.0
Q9	13.8	20.0	13.3

	G	D	S
Q6	1.7	5.0	2.2

<ADDRESS INFORMATION>

SENSOR BOARD

IC1	B1,C1
Q1	C1

DRIVE BOARD

IC1	A3
IC2	C3
IC3	C4,C5
IC4	A4,A5
IC5	A5
Q1	B3
Q2	B3
Q5	B4
Q6	C4
Q7	B5
Q8	B5
Q9	B3
D1	C3
D2	C3

<ADDRESS INFORMATION> <VOLTAGES>

PROCESS BOARD

IC1	C2
IC2	C2
IC3	A2,A3,B2,B3
IC4	C5
IC5	B6,C6
IC6	A6,B6
IC7	A5,B5
Q1	C1,C2
Q2	C2
Q3	C2
Q7	C3
Q8	C3
Q9	C4
Q11	C4
Q12	B1
Q13	B1
Q14	B4
Q15	C5
Q16	B5
Q17	B6
Q18	A6
Q19	C2
Q20	D2
D1	B4
D2	A4

PROCESS SUB BOARD

IC1	D1

Process Board

	IC1	IC2	IC3	IC4	IC5	IC6	IC7
Pin 1	0	2.0	0.7	0	5.0	0	0
2	5.0	2.0	0.7	0	0	0	4.5
3	0	5.0	0	4.4	5.0	0.5	5.0
4	0	0	2.1	0	0	0.5	5.0
5	5.0	1.7	1.8	0	0	0.5	-0.8
6		1.9	1.5	0	0	0	2.2
7		0	3.1	0	0	0	0
8		5.0	2.6	5.0	0	0	-0.7
9			1.7		5.0	0	2.2
10			0		5.0	0	5.0
11			1.8		0	0	5.0
12			4.6		0	5.0	0
13			2.5		0	5.0	0
14			5.0		0	5.0	5.0
15			1.8		5.0	0	
16			2.5		0	5.0	
17			1.7		0		
18			2.0		5.0		
19			2.6		5.0		
20			0		5.0		
21			2.4		0		
22			2.1		0		
23			0.6		5.0		
24			2.1		0		
25			0.6		0.2		
26			0.6		0		
27			0.6		0		
28			0.6		0		
29			0.6		0		
30			0.6		0		
31			0.6		0		
32			0.6		5.0		
33			0		0		
34			0		5.0		
35			0		0		
36			0		0		
37			0		5.0		
38			2.3		5.0		
39			3.1		5.0		
40			0.8		5.0		
41			0		5.0		
42			2.3		2.3		
43			0.1		0		
44			4.2		0.5		

	B	C	E
Q7	1.8	5.0	1.2
Q8	1.8	0	2.5
Q9	1.9	0	2.6
Q11	2.6	5.0	2.0
Q12	1.4	5.0	0.8
Q13	0.8	0	1.4
Q14	1.8	0	2.5
Q15	4.5	0.2	5.0
Q16	0	5.0	0
Q19	1.5	4.3	0.8
Q20	4.3	9.2	3.7

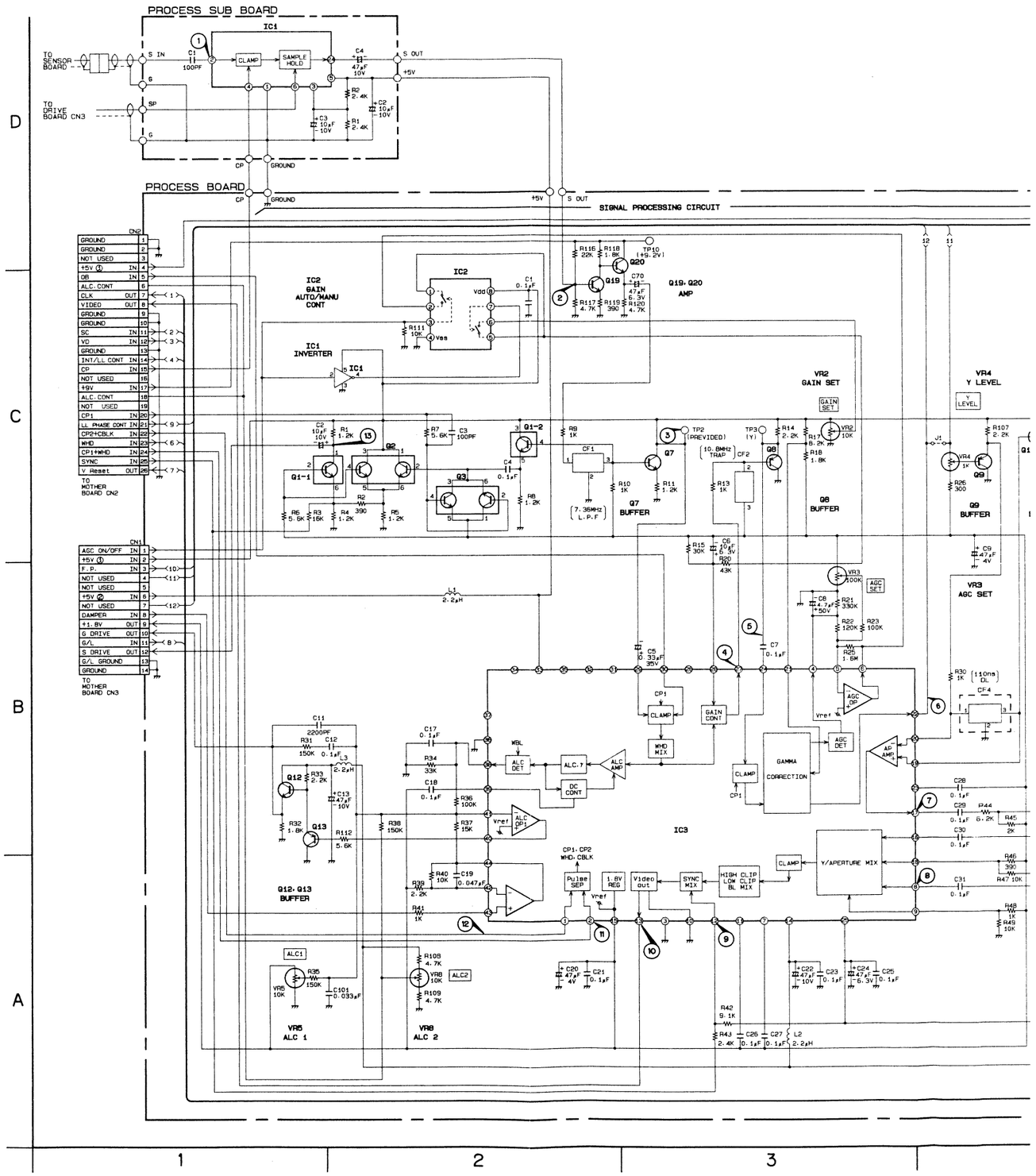
Process Sub Board

	IC1
Pin 1	0
2	2.5
3	2.5
4	1.4
5	5.0
6	1.0
7	0
8	0
9	1.0
10	0
11	0
12	0.3
13	0.1
14	0
15	0
16	0
17	0
18	0
19	0
20	0
21	0
22	0.1
23	1.0
24	2.5

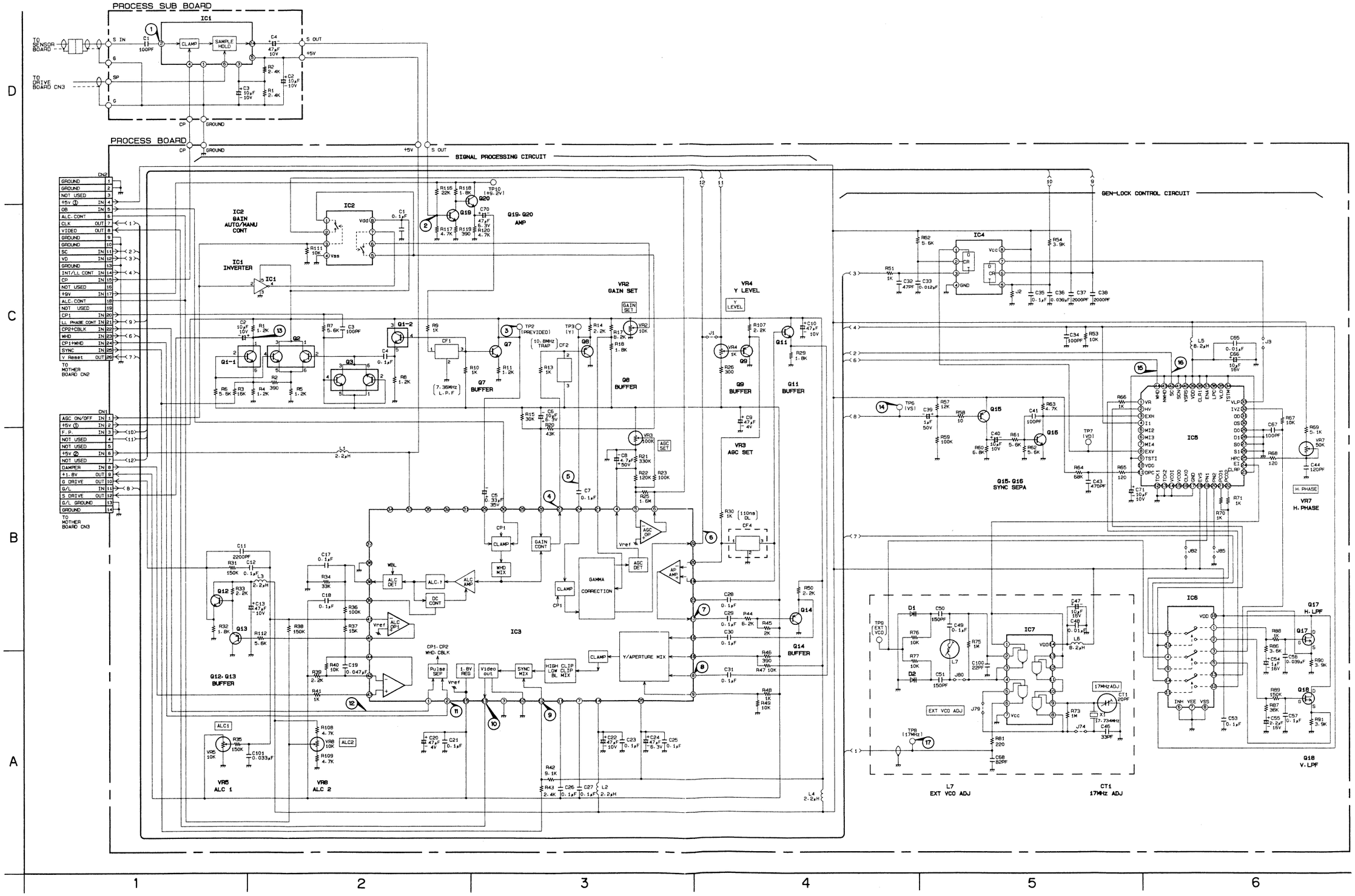
	Q1	Q2	Q3
Pin1	4.1	5.0	1.8
2	1.8	1.8	0.1
3	5.0	5.0	2.0
4	1.8	1.8	0.1
5	1.2	1.3	1.8
6	1.2	1.3	2.0

	G	D	S
Q17	0	5.0	0.5
Q18	0	5.0	0.5

SCHEMATIC DIAGRAM OF PROCESS BOARD

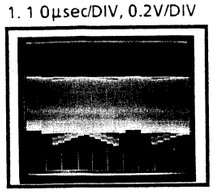


SCHEMATIC DIAGRAM OF PROCESS BOARD

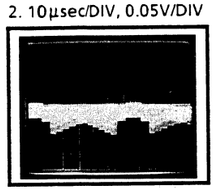


CONDUCTOR VIEW OF PROCESS BOARD

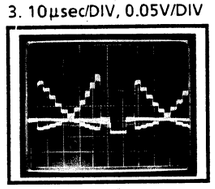
1. 1 0µsec/DIV, 0.2V/DIV



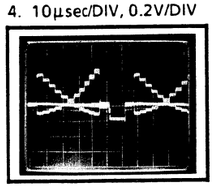
2. 10µsec/DIV, 0.05V/DIV



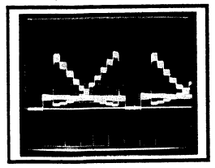
3. 10µsec/DIV, 0.05V/DIV



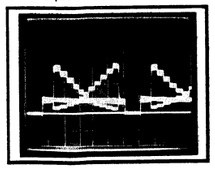
4. 10µsec/DIV, 0.2V/DIV



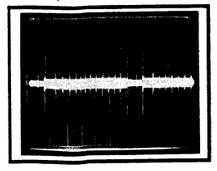
5. 10µsec/DIV, 0.2V/DIV



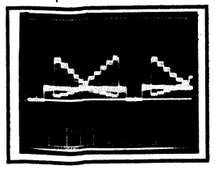
6. 10µsec/DIV, 0.2V/DIV



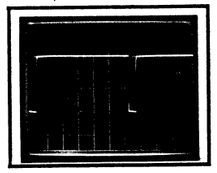
7. 10µsec/DIV, 0.2V/DIV



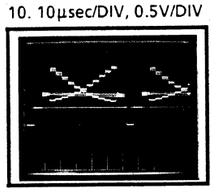
8. 10µsec/DIV, 0.1V/DIV



9. 10µsec/DIV, 1V/DIV



10. 10µsec/DIV, 0.5V/DIV



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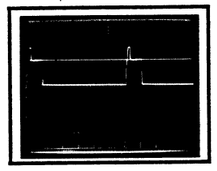

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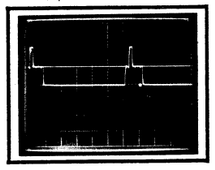
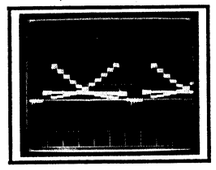
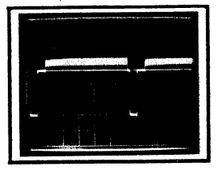


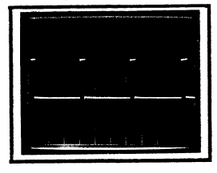
13. 10µsec/DIV, 0.1V/DIV



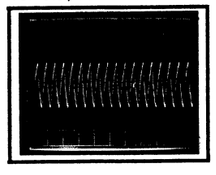
14. 10µsec/DIV, 0.1V/DIV



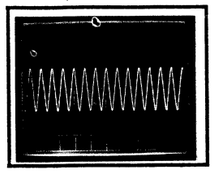
15. 20µsec/DIV, 2V/DIV

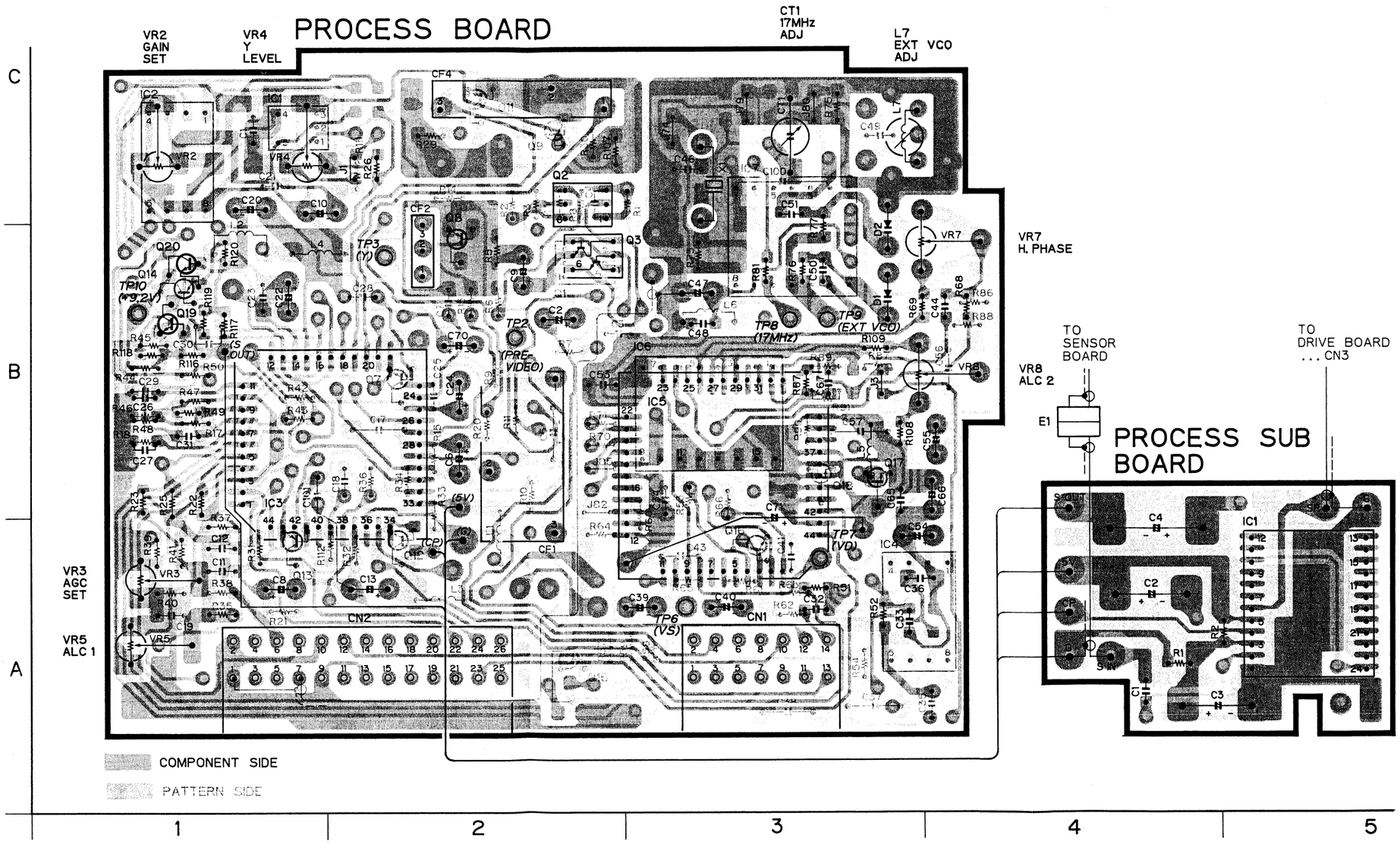


16. 0.5µsec/DIV, 1V/DIV



17. 0.1µsec/DIV, 1V/DIV





<ADDRESS INFORMATION>

PROCESS BOARD

IC1	C1	IC5	A3,B3	Q2	C2	Q9	C2	Q14	B1	Q18	B3
IC2	C1	IC6	B3	Q3	B2	Q11	C2	Q15	A2	Q19	B1
IC3	B1,B2	IC7	B3,C3	Q7	B2	Q12	A2	Q16	A3	Q20	B1
IC4	A3	Q1	B2	Q8	B2	Q13	A1	Q17	B3	D1	B3
										D2	B3

PROCESS SUB BOARD

IC1	A5

SCHEMATIC DIAGRAM OF DC/DC BOARD

<ADDRESS INFORMATION>

DC/DC BOARD

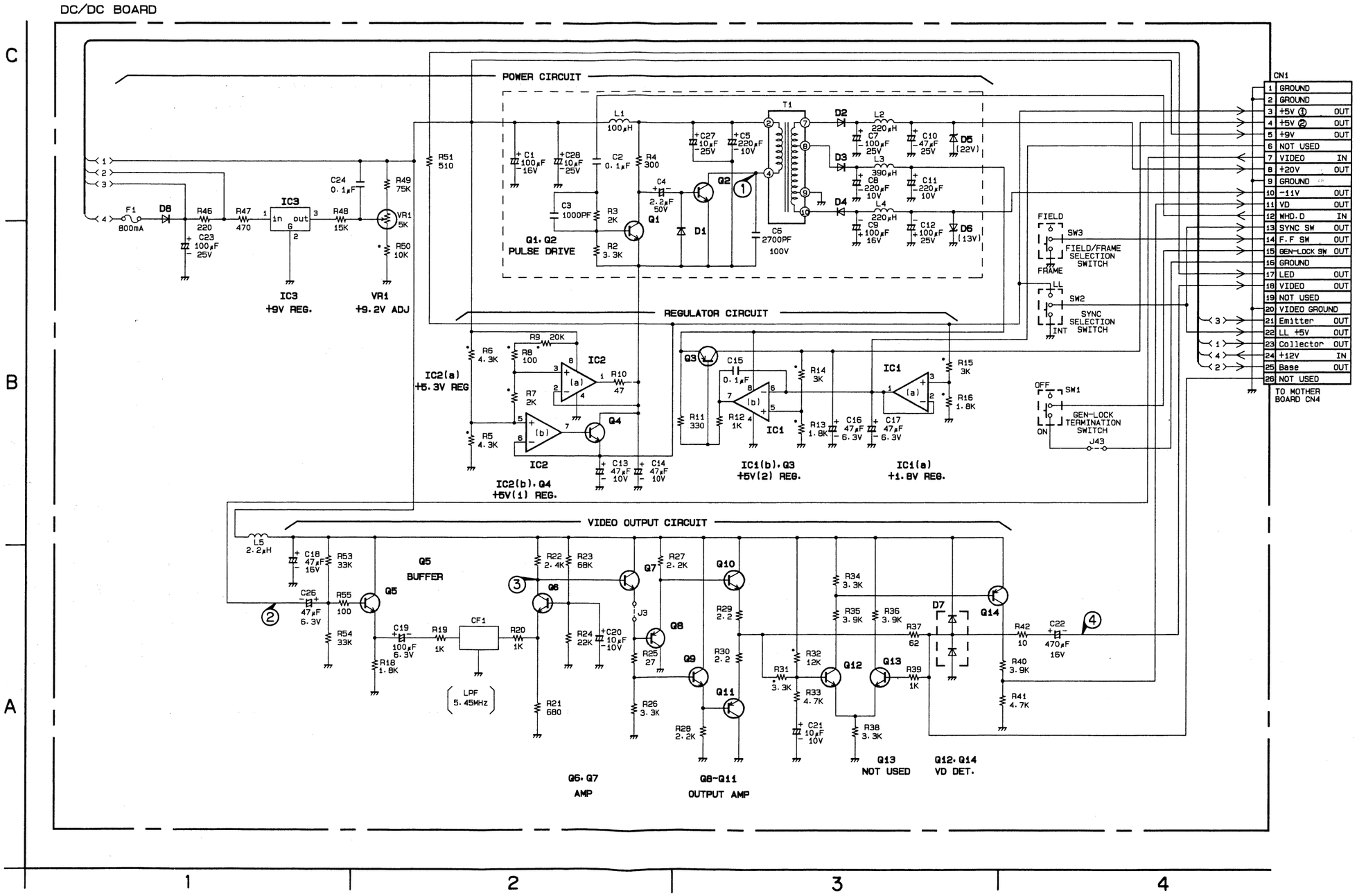
IC1	B3
IC2	B2
IC3	B1,C1
Q1	B2
Q2	C3
Q3	B3
Q4	B2
Q5	A2
Q6	A2
Q7	A2
Q8	A2
Q9	A3
Q10	A3
Q11	A3
Q12	A3
Q13	A3
Q14	A3
D1	B3
D2	C3
D3	C3
D4	C3
D5	C3
D6	B3
D7	A3
D8	B1

<VOLTAGES>

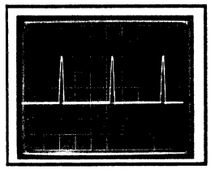
DC/DC Board

	IC1	IC2	IC3
Pin 1	1.9	3.7	7.5
2	1.9	5.4	0
3	1.9	5.4	1.2
4	0	0	
5	1.9	5.0	
6	1.9	5.0	
7	3.6	5.7	
8	6.3	9.2	

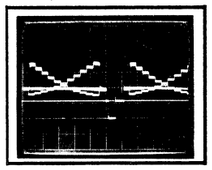
	B	C	E
Q1	5.0	7.0	5.4
Q2	5.4	8.9	5.9
Q3	5.7	5.0	6.3
Q4	5.7	5.4	5.0
Q5	4.5	9.2	3.8
Q6	2.0	4.9	1.2
Q7	4.9	9.2	4.3
Q8	4.3	0	4.9
Q9	4.2	9.2	3.6
Q10	4.9	9.2	4.3
Q11	3.6	0	4.3
Q12	4.9	4.3	4.2
Q13	4.3	9.2	4.2
Q14	8.5	9.2	9.2
Q101	9.6	9.2	10.3



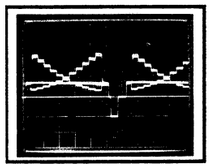
1. 20µsec/DIV, 20V/DIV



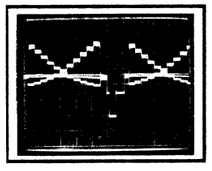
2. 10µsec/DIV, 0.5V/DIV



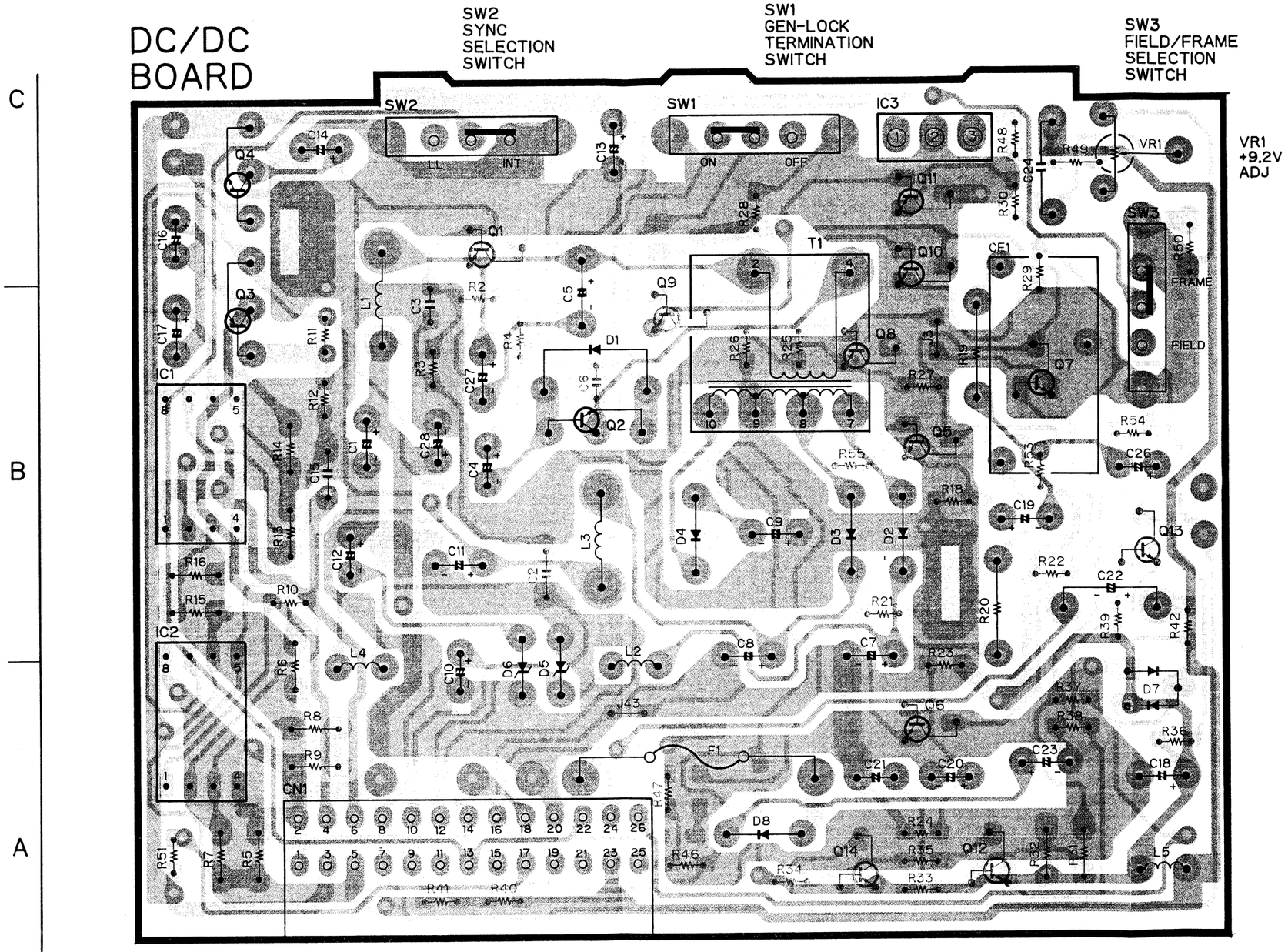
3. 10µsec/DIV, 0.5V/DIV



4. 10µsec/DIV, 0.2V/DIV



DC/DC BOARD



COMPONENT SIDE

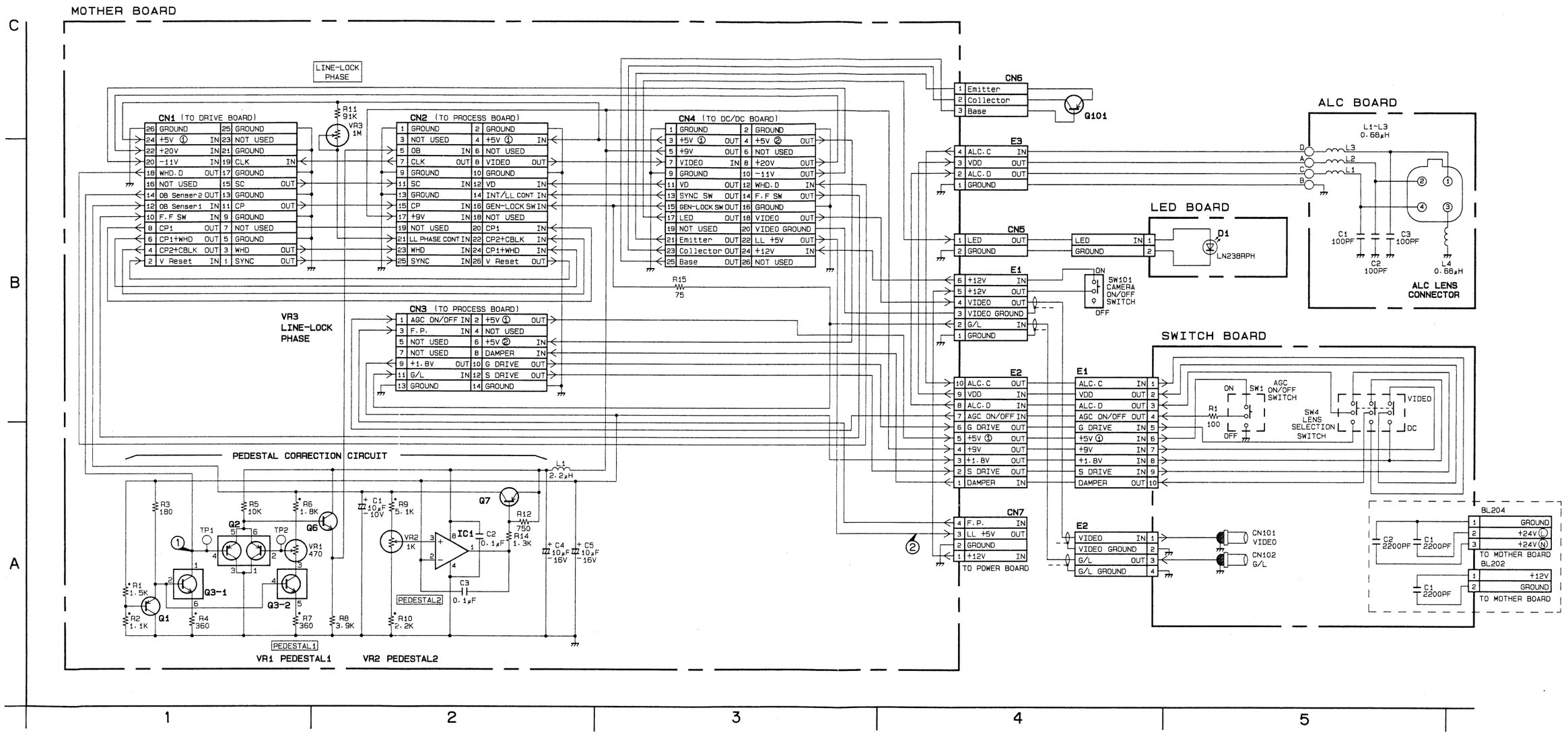
PATTERN SIDE

<ADDRESS INFORMATION>

DC/DC BOARD

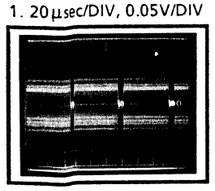
IC1	B1
IC2	A1
IC3	C3
Q1	C2
Q2	B2
Q3	B1
Q4	C1
Q5	B3
Q6	A3
Q7	B3
Q8	B3
Q9	B2
Q10	C3
Q11	C3
Q12	A3
Q13	B3
Q14	A3
D1	B2
D2	B3
D3	B3
D4	B2
D5	A2
D6	A2
D7	A3
D8	A2

SCHEMATIC DIAGRAM OF MOTHER BOARD, SWITCH BOARD, ALC BOARD, LED BOARD

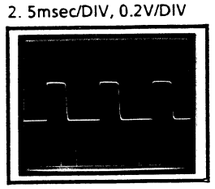


Mother Board

1. 20μsec/DIV, 0.05V/DIV



2. 5msec/DIV, 0.2V/DIV



<VOLTAGES>

Mother board

	IC1
Pin 1	7.3
2	2.0
3	2.0
4	0
5	1.3
6	1.2
7	8.8
8	9.2

	Q2	Q3
Pin1	0	2.0
2	1.8	1.4
3	0	1.4
4	2.0	1.4
5	2.4	0.9
6	2.4	0.9

	B	C	E
Q1	0.8	0	1.4
Q6	2.4	9.2	1.8
Q7	8.5	6.4	9.2

	B	C	E
Q101	10.0	9.2	10.7

<ADDRESS INFORMATION>

MOTHER BOARD

IC1	A2
Q1	A1
Q2	A1
Q3	A1
Q6	A2
Q7	A2

LED BOARD

D1	B5

POWER TRANSISTOR

Q101	C4

CONDUCTOR VIEW OF MOTHER BOARD, SWITCH BOARD, ALC BOARD, LED BOARD

<ADDRESS INFORMATION>

MOTHER BOARD

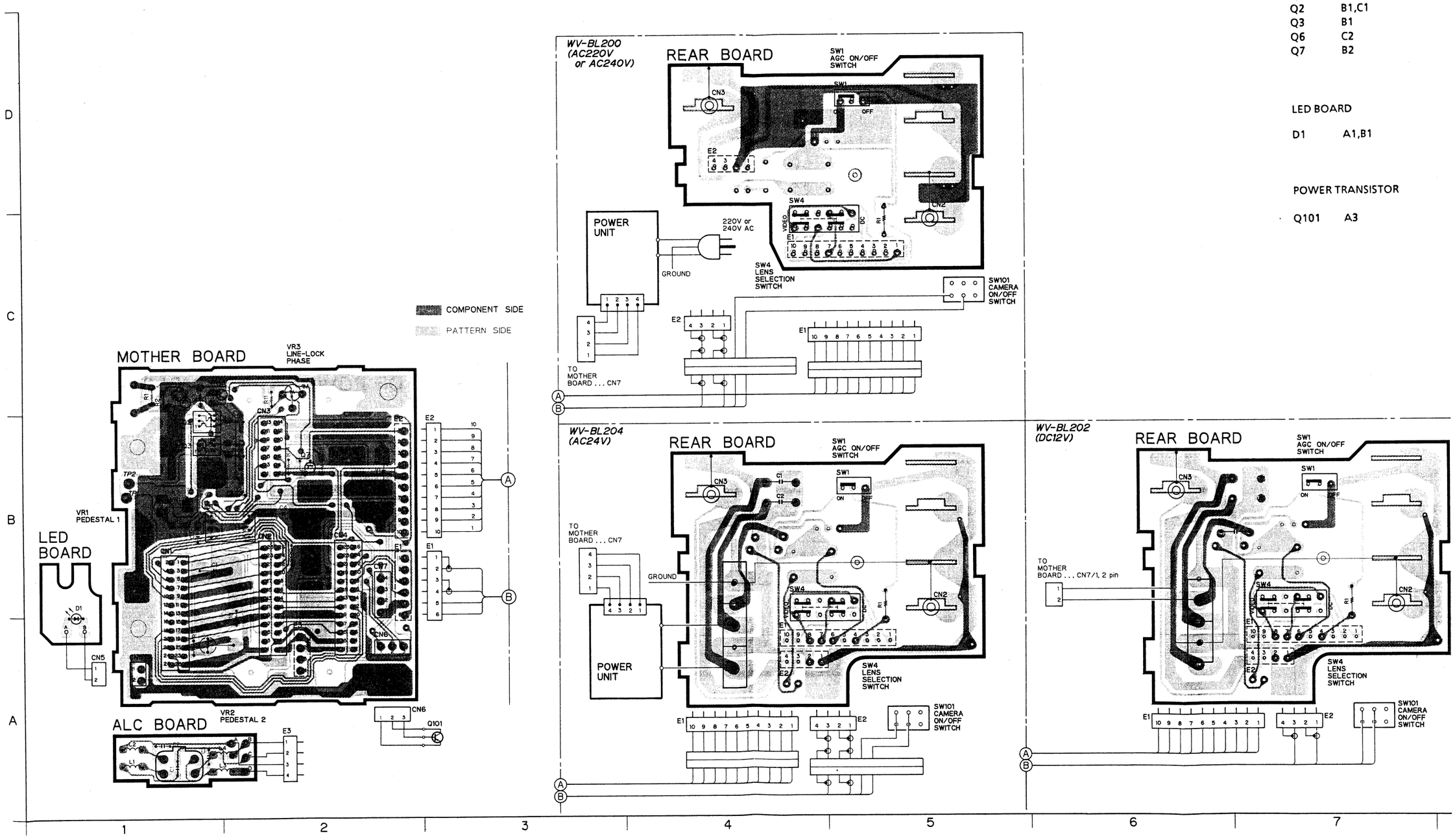
IC1	B1,B2
Q1	C1
Q2	B1,C1
Q3	B1
Q6	C2
Q7	B2

LED BOARD

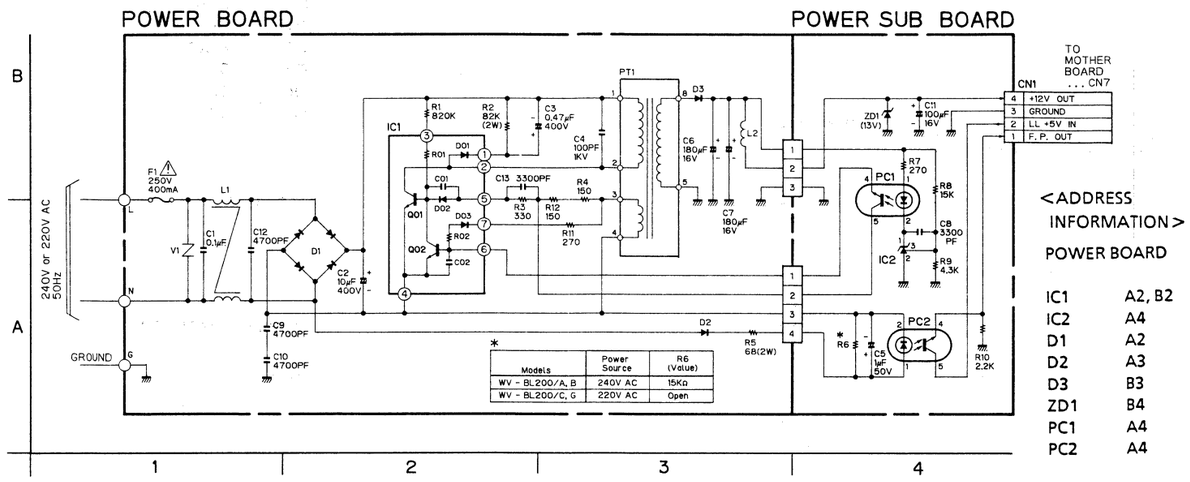
D1	A1,B1

POWER TRANSISTOR

Q101	A3



SCHEMATIC DIAGRAM OF POWER BOARD (WV-BL200)



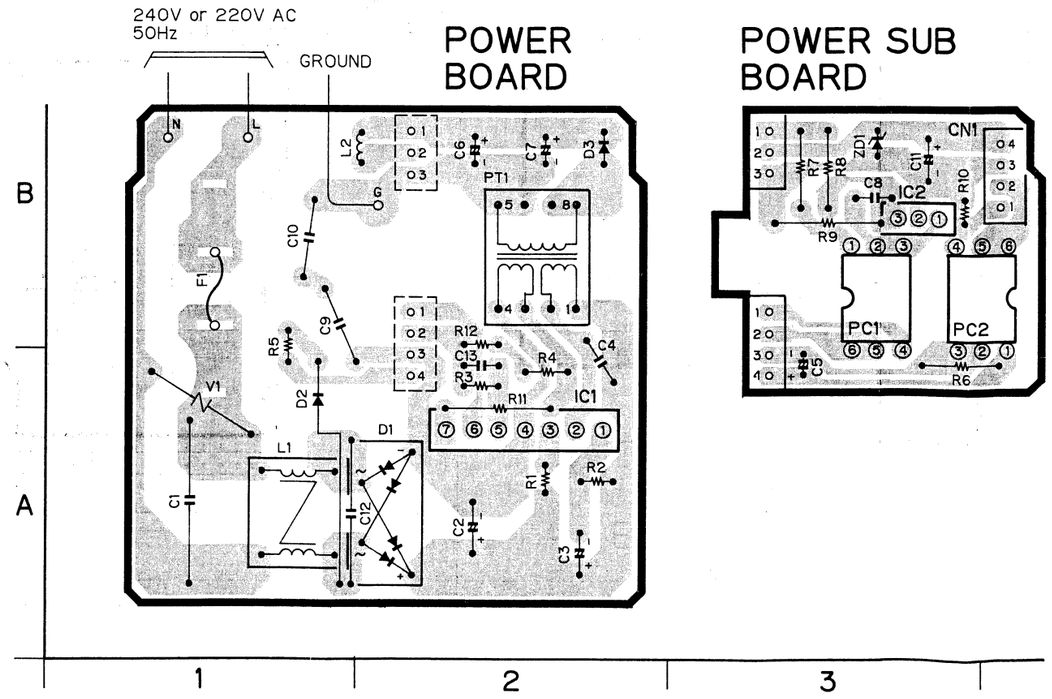
Models	Power Source	R6 (Value)
WV - BL200/A, B	240V AC	15KΩ
WV - BL200/C, G	220V AC	Open

<ADDRESS INFORMATION>

POWER BOARD

IC1	A2, B2
IC2	A4
D1	A2
D2	A3
D3	B3
ZD1	B4
PC1	A4
PC2	A4

CONDUCTOR VIEW OF POWER BOARD (WV-BL200)



<VOLTAGES>

Power Board
WV-BL200(AC220V)

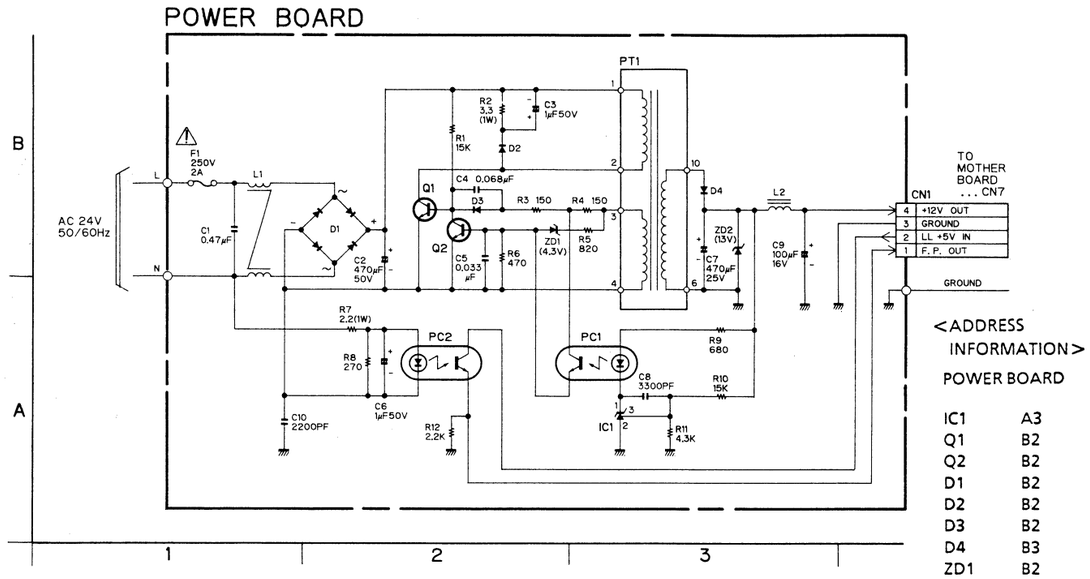
	IC1	IC2
Pin 1	0.5	8.8
2	159.5	0
3	0.2	2.5
4	-0.2	
5	-0.2	
6	-0.1	
7	-0.1	

<ADDRESS INFORMATION>

POWER BOARD

IC1	A2
IC2	B3
D1	A2
D2	A2
D3	B2
ZD1	B3
PC1	B3
PC2	B3

SCHEMATIC DIAGRAM OF POWER BOARD (WV-BL204)

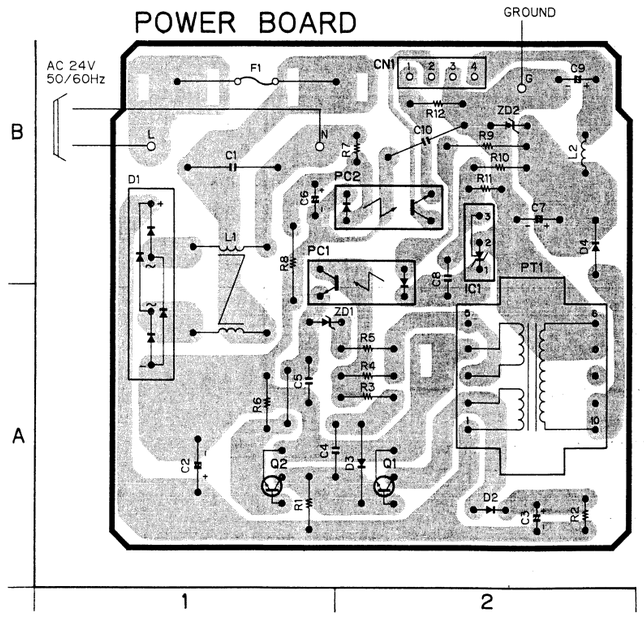


<ADDRESS INFORMATION>

POWER BOARD

IC1	A3
Q1	B2
Q2	B2
D1	B2
D2	B2
D3	B2
D4	B3
ZD1	B2
ZD2	B3
PC1	A2,A3
PC2	A2

CONDUCTOR VIEW OF POWER BOARD (WV-BL204)



<VOLTAGES>

Power Board
WV-BL204(AC24V)

	IC1
Pin 1	8.0
2	0
3	2.5

<ADDRESS INFORMATION>

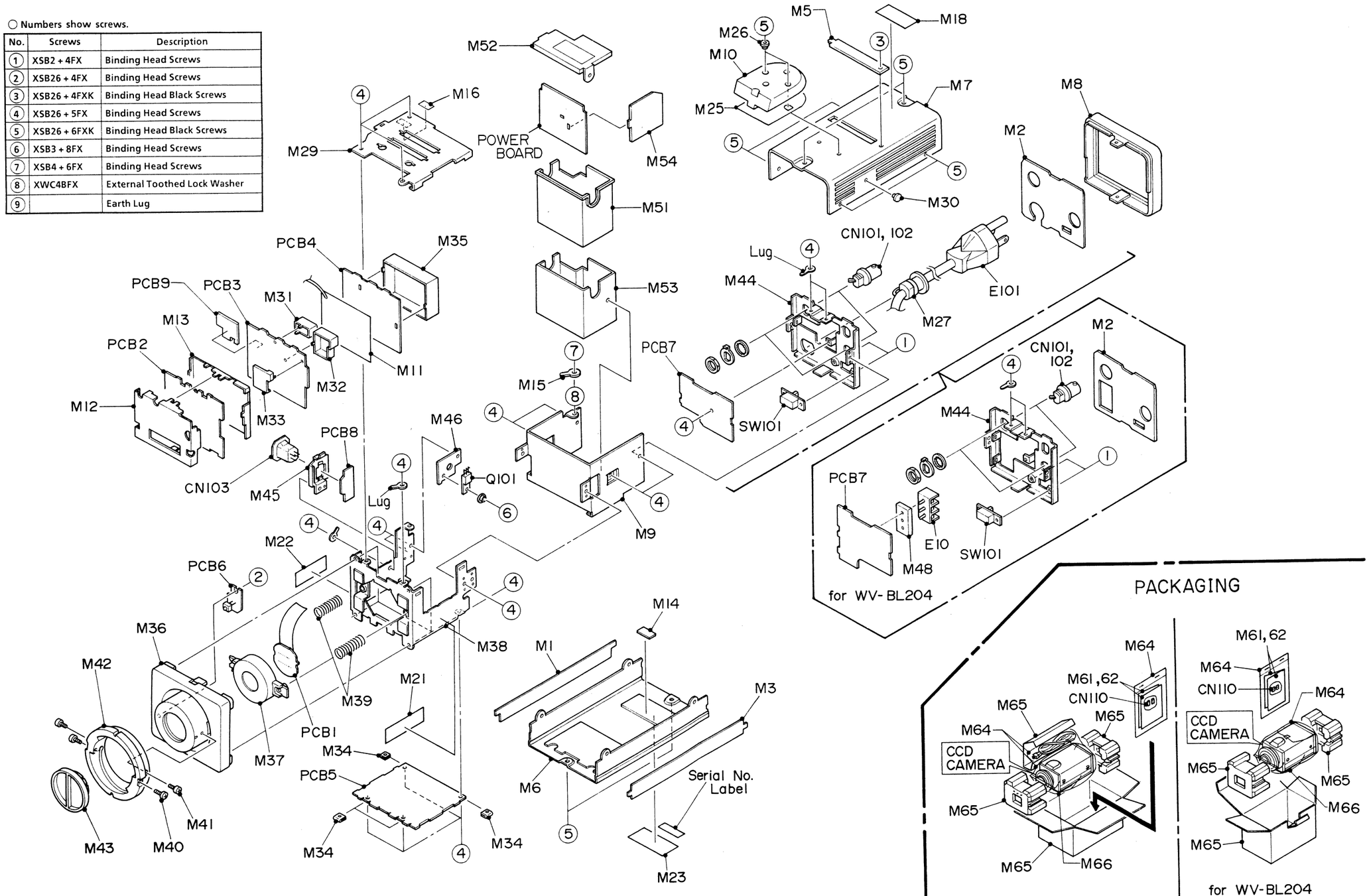
POWER BOARD

IC1	B2
Q1	A2
Q2	A1
D1	A1,B1
D2	A2
D3	A2
D4	B2
ZD1	A1,A2
ZD2	B2
PC1	A2,B2
PC2	B2

EXPRODED VIEW OF WV-BL200/204

○ Numbers show screws.

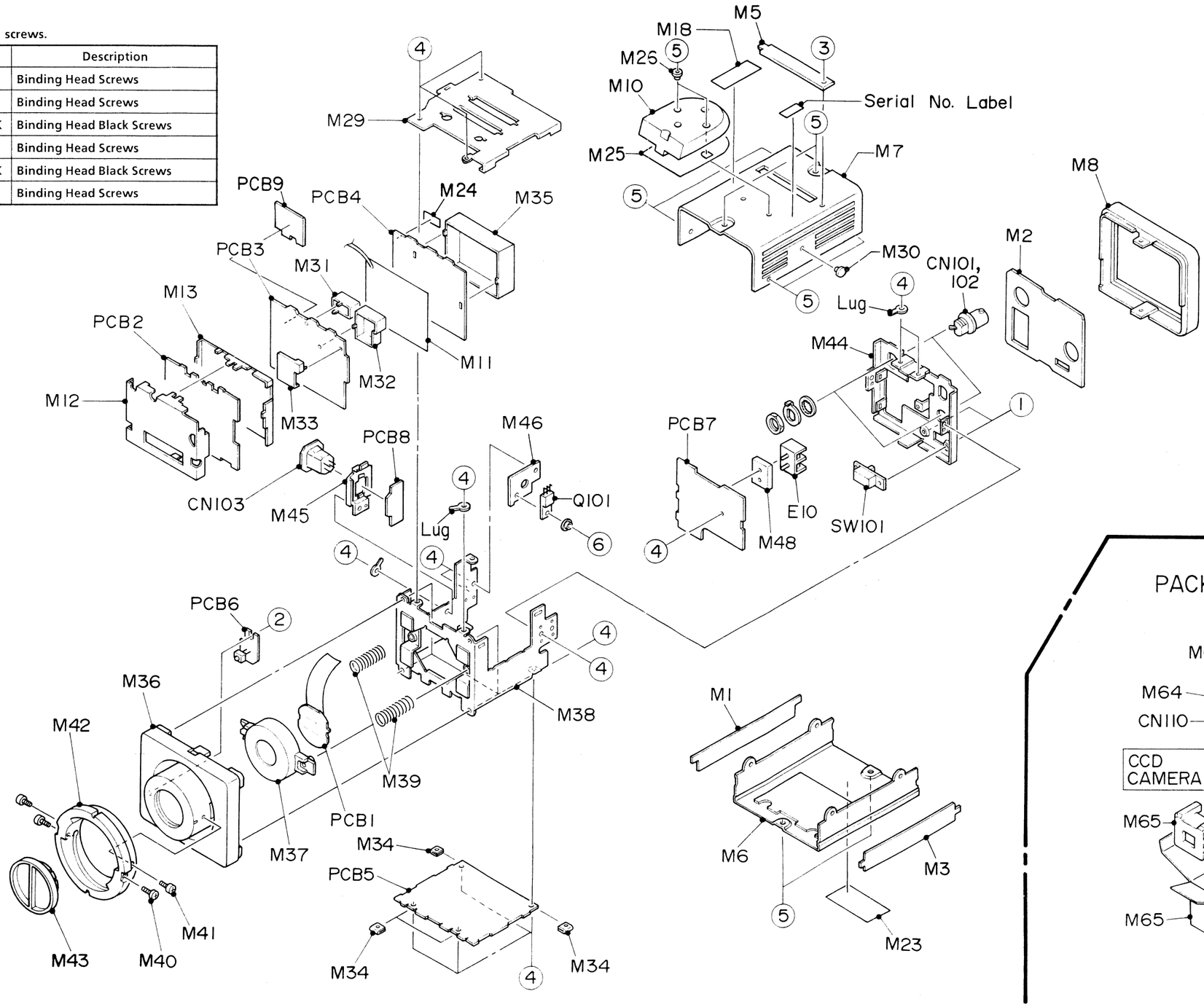
No.	Screws	Description
①	XSB2 + 4FX	Binding Head Screws
②	XSB26 + 4FX	Binding Head Screws
③	XSB26 + 4FXK	Binding Head Black Screws
④	XSB26 + 5FX	Binding Head Screws
⑤	XSB26 + 6FXK	Binding Head Black Screws
⑥	XSB3 + 8FX	Binding Head Screws
⑦	XSB4 + 6FX	Binding Head Screws
⑧	XWC4BFX	External Toothed Lock Washer
⑨		Earth Lug



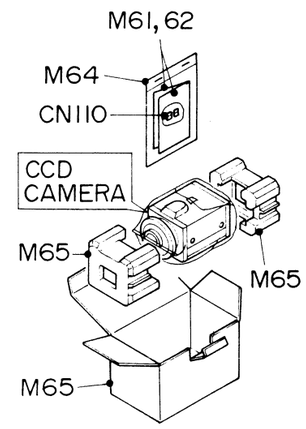
EXPRODED VIEW OF WV-BL202

○ Numbers show screws.

No.	Screws	Description
(1)	XSB2 + 4FX	Binding Head Screws
(2)	XSB26 + 4FX	Binding Head Screws
(3)	XSB26 + 4FXK	Binding Head Black Screws
(4)	XSB26 + 5FX	Binding Head Screws
(5)	XSB26 + 6FXK	Binding Head Black Screws
(6)	XSB3 + 8FX	Binding Head Screws



PACKAGING



REPLACEMENT PARTS LIST

Important Notice

1. Components identified by "⚠" mark have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.
2. Printed circuit board assembly with mark (NLA) is no longer available after production discontinuation of the complete set.

REF.NO.	PART NO.	DESCRIPTION
CCTV CAMERA WV-BL200		
MISCELLANEOUS		
Q101	2SB941-PQR	Transistor
SW101	YFMFS201N	Slide Switch
CN101,102	YWHXC0325900	BNC Connector
CN103	YFD4151N200	ALC Connector
E101 ⚠	YFKPGTSA25	AC Power Cord for WV-BL200/A
	HBS308A	AC Power Cord for WV-BL200/B
	YWCE009908FA	AC Power Cord for WV-BL200/C
	YWVM009908A	AC Power Cord for WV-BL200/G
M1	YWV5WC0884A4	Left Side Bottom Panel
M2	YWV5WA0885A4	Rear Panel
M3	YWV5WD0893A4	Bottom Panel
M5	YFV5EA0359A4	Blank Cover
M6	YWV5EA0632A2	Bottom Cover
M7	YWV5EA0633A2	Upper Cover
M8	YFV5BA0026A3	Escutcheon
M9	YWV2SA1315A2	Mounting Angle
M10	YWV2TB0169A3	Mounting Bracket
M11	YWV2PA0315A4	Insulator
M12	YWV2HA0622A4	Shield Cover 1 for Drive Board
M13	YWV2HA0623A4	Shield Cover 2 for Drive Board
M14	YFV2FA0122A4	Cushion
M15	YW-BCG-EM01	Earth Lug
M16	YFV2PA0188A4	Insulator
M18 ⚠	YFV7MA0099A4	Safety Label
M21 ⚠	YWV7MA0270A4	Safety Label
M23 ⚠	YWV7QA1818A4	Main Label for WV-BL200/A
	YWV7QA1809A4	Main Label for WV-BL200/B
	YWV7QA1816A4	Main Label for WV-BL200/C
	YWV7QA1817A4	Main Label for WV-BL200/G
M25	YFV2PA0207A4	Insulator
M26	YFV2NA0084A4	Spacer
M27 ⚠	YWSR6W1	Cord Clamp
M29	YWV2EA0116A3	Guide
M30	YWV5GA0068A4	Cap
M36	YWV5BA0060A2	Escutcheon
M37	YWV9BA0010AN	CCD Image Sensor Assy
M38	YWV2SA1316A2	Mounting Angle
M39	YWV4JA0262A4	Spring
M40	YWV1EA0127A4	Special Screw
M41	YWV1EA0128A4	Special Screw
M42	YWV3FA0101A3	Ring
M43	YWBC-2B	Body Cap
M44	YWV2KA0490A2	Rear Chassis
M45	YWV2SA1314A4	Mounting Angle
M46	YWV7DA0220A4	Heat Sink
SENSOR BOARD		
PCB1 (NLA)	YWVKYBL20E1A	Printed Circuit Board Assy
Q1	2SC3931-CD	Transistor
R2	ERJ3GEYJ330	Metal 33 ohms 1/16W
R5,6	ERJ3GEYJ101	Carbon 100 ohms 1/16W
R7	ERJ3GEYJ222	Metal 2.2K ohms 1/16W
R8-11	ERJ3GEYJ330	Metal 33 ohms 1/16W
C1	YF426682XKT	Ceramic 6800 pF 50V
C2	ECST1VC225	Electrolytic 2.2 µF 35V
C3	ECST1VY334	Electrolytic 0.33 µF 35V
C4,5	YF426104XKS	Ceramic 0.1 µF
J1	ERJ3GEY0R00	Jumper Resistor
J3,4	ERJ3GEY0R00	Jumper Resistor
DRIVE BOARD		
PCB2 (NLA)	YWVKYBL20E2A	Printed Circuit Board Assy
IC1	YWUPD6147G	IC
IC2	MN74HCU04S	IC
IC3	YWTC6003F	IC
IC4	YWTC6013U	IC
IC5	YWTC4S69F	IC
Q1	2SD1819-QRS	Transistor
Q2	2SB1218-QRS	Transistor
Q5	2SD1819-QRS	Transistor
Q6	2SK662-PQR	FET
Q7	2SD1819-QRS	Transistor
Q8	2SB1218-QRS	Transistor
Q9	2SD1819-QRS	Transistor
D1,2	1SV153	Diode
R1	ERJ3GEYJ222	Metal 2.2 K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION
R2	ERJ3GEYJ123	Metal 12K ohms1/16W
R3	ERJ3GEYJ752	Metal 7.5K ohms1/16W
R4	ERJ3GEYJ332	Metal 3.3K ohms1/16W
R5,6	ERJ3GEYJ104	Metal 100K ohms1/16W
R13	ERJ3GEYJ104	Metal 100K ohms1/16W
R15	ERJ3GEYJ303	Metal 30K ohms1/16W
R16	ERJ3GEYJ103	Metal 10K ohms1/16W
R17	ERJ3GEYJ202	Metal 2K ohms1/16W
R18	ERJ3GEYJ163	Metal 16K ohms1/16W
R19	ERJ3GEYJ432	Metal 4.3K ohms1/16W
R20	ERJ3GEYJ103	Metal 10K ohms1/16W
R21	ERJ3GEYJ221	Metal 220 ohms1/16W
R22	ERJ3GEYJ105	Metal 1M ohms1/16W
R23	ERJ3GEYJ103	Metal 10K ohms1/16W
R24	ERJ3GEYJ562	Metal 5.6K ohms1/16W
R25	ERJ3GEYJ102	Metal 1K ohms1/16W
R26	ERJ3GEYJ103	Metal 10K ohms1/16W
R27	ERJ3GEYJ471	Metal 470 ohms1/16W
R28	ERJ3GEYJ271	Metal 270 ohms1/16W
R31	ERJ3GEYJ105	Metal 1M ohms1/16W
R34	ERJ3GEYJ221	Metal 220 ohms1/16W
R41	ERJ3GEYJ562	Metal 5.6K ohms1/16W
R42	ERJ3GEYJ103	Metal 10K ohms1/16W
R45	ERJ3GEYJ561	Metal 560 ohms1/16W
R46,47	ERJ3GEYJ562	Metal 5.6K ohms1/16W
R48,49	ERJ3GEYJ561	Metal 560 ohms1/16W
R51	ERJ3GEYJ562	Metal 5.6K ohms1/16W
R52	ERJ3GEYJ561	Metal 560 ohms1/16W
R53	ERJ3GEYJ272	Metal 2.7K ohms1/16W
R54	ERJ3GEYJ561	Metal 560 ohms1/16W
R57	ERJ3GEYJ103	Metal 10K ohms1/16W
R59	ERJ3GEYJ221	Metal 220 ohms1/16W
R60	ERJ3GEYJ751	Metal 750 ohms1/16W
R61,62	ERJ3GEYJ561	Metal 560 ohms1/16W
R64,65	ERJ3GEYJ820	Metal 82 ohms1/16W
R66	ERJ3GEYJ330	Metal 33 ohms1/16W
R100	ERJ8GEYJ8R2	Solid Resistor 8.2 ohms
VR1	EVML1GA00B15	Variable Resistor 100K ohms
VR2	EVML1GA00B53	Variable Resistor 5K ohms
C1	ECEA1EKS100	Electrolytic 10 µF 25V
C2	ECEA1CK220	Electrolytic 22 µF 16V
C3,4	ECEA1AKS330	Electrolytic 33 µF 10V
C7	ECEA1CK220	Electrolytic 22 µF 16V
C10	ECEA1HKS010	Electrolytic 1 µF 50V
C12,14	YF400331CHJT	Ceramic 330 pF
C15	YW5X103K2VB	Ceramic 0.01 µF
C16	ECST1AC106ZR	Tantalum 10 µF 10V
C17	YW5X472K2VB	Ceramic 4700 pF
C18	ECEA1HKK2R2	Electrolytic 2.2 µF 25V
C25,27	YW5X103K2VB	Ceramic 0.01 µF
C30	ECEA1CKS100	Electrolytic 10 µF 16V
C31	YW5X103K2VB	Ceramic 0.01 µF
C33	ECST1AC106ZR	Tantalum 10 µF 10V
C34	YW5X103K2VB	Ceramic 0.01 µF
C35	ECST1AC106ZR	Tantalum 10 µF 10V

REF.NO.	PART NO.	DESCRIPTION
C36	YW5X103K2VB	Ceramic 0.01 µF
C37	ECEA1HKS010	Electrolytic 1 µF 50V
C40	YW5X103K2VB	Ceramic 0.01 µF
C41	ECST1AC106ZR	Tantalum 10 µF 10V
C44,45	YW5CH470J5VB	Ceramic 47 pF
C46	YW5CH100J5VB	Ceramic 10 pF
C47,50	YW5CH470J5VB	Ceramic 47 pF
C51	YW5CH470J5VB	Ceramic 47 pF
C52	YW5CH100J5VB	Ceramic 10 pF
C53	ECST1AC106ZR	Tantalum 10 µF 10V
C54	YW5X103K2VB	Ceramic 0.01 µF
C55	ECST1ED475	Tantalum 4.7 µF 25V
C57	ECEA1HKS2R2	Electrolytic 2.2 µF 50V
C58	ECEA1EKS100	Electrolytic 10 µF 25V
C60	ECEA1HKS2R2	Electrolytic 2.2 µF 50V
C63	YW5CH820J5VB	Ceramic 82 pF
C66-68	YW5X103K2VB	Ceramic 0.01 µF
C100	ECSF1VE224	Tantalum 0.22 µF 35V
C101,102	ECKF1H152KB	Ceramic 1500 pF 50V
L1	YFF3216A2R2K	Coil 2.2 µH
L2	YWS5LD30426	Coil
L3,4	YFF3216A2R2K	Coil 2.2 µH
L6	YWNL322R2K	Coil 2.2 µH
L7,8	YFF3216A2R2K	Coil 2.2 µH
J30,33	ERJ3GEY0R00	Jumper Resistor
J35-39	ERJ3GEY0R00	Jumper Resistor
J63	ERJ3GEY0R00	Jumper Resistor
CN1	YW520301410	14-pin Connector
CN2	YW530202610	26-pin Connector
CN3	EMCS0250Z	2-pin Connector

PROCESS BOARD

PCB3 (NLA)	YWVKYBL20E3A	Printed Circuit Board Assy
IC1	YWTC4S69F	IC
IC2	MN6287S	IC
IC3	AN2050FB	IC
IC4	BA226AF	IC
IC5	YWPD65012GB	IC
IC6	MN4053BS	IC
IC7	TC40H000F	IC
Q1	XN6501	Transistor
Q2,3	XN6501	Transistor
Q7	2SD1819-QRS	Transistor
Q8,9	2SB1218-QRS	Transistor
Q11,12	2SD1819-QRS	Transistor
Q13-15	2SB1218-QRS	Transistor
Q16	2SC3931-CD	Transistor
Q17,18	2SK662-PQR	FET
Q19	2SC3931-CD	Transistor
Q20	2SD1819-QRS	Transistor
D1,2	1SV153	Diode
R1	ERJ3GEYJ122	Metal 1.2K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	
R2	ERJ3GEYJ391	Metal	390 ohms 1/16W
R3	ERJ3GEYJ163	Metal	16K ohms 1/16W
R4,5	ERJ3GEYJ122	Metal	1.2K ohms 1/16W
R6,7	ERJ3GEYJ562	Metal	5.6K ohms 1/16W
R8	ERJ3GEYJ122	Metal	1.2K ohms 1/16W
R9,10	ERJ3GEYJ102	Metal	1K ohms 1/16W
R11	ERJ3GEYJ122	Metal	1.2K ohms 1/16W
R13	ERJ3GEYJ102	Metal	1K ohms 1/16W
R14	ERJ3GEYJ222	Metal	2.2K ohms 1/16W
R15	ERJ3GEYJ303	Metal	30K ohms 1/16W
R17	ERJ3GEYJ822	Metal	8.2K ohms 1/16W
R18	ERJ3GEYJ182	Metal	1.8K ohms 1/16W
R20	ERJ3GEYJ433	Metal	43K ohms 1/16W
R21	ERJ3GEYJ334	Metal	330K 1/16W
R22	ERJ3GEYJ124	Metal	120K ohms 1/16W
R23	ERJ3GEYJ104	Metal	100K ohms 1/16W
R25	YW2116165JT	Carbon	1.6M ohms
R26	ERJ3GEYJ301	Metal	300 ohms 1/16W
R29	ERJ3GEYJ182	Metal	1.8K ohms 1/16W
R30	ERJ3GEYJ102	Metal	1K ohms 1/16W
R31	ERJ3GEYJ154	Metal	150K ohms 1/16W
R32	ERJ3GEYJ182	Metal	1.8K ohms 1/16W
R33	ERJ3GEYJ222	Metal	2.2K ohms 1/16W
R34	ERJ3GEYJ333	Metal	33K ohms 1/16W
R35	ERJ3GEYJ154	Metal	150K ohms 1/16W
R36	ERJ3GEYJ104	Metal	100K ohms 1/16W
R37	ERJ3GEYJ153	Metal	15K ohms 1/16W
R38	ERJ3GEYJ154	Metal	150K ohms 1/16W
R39	ERJ3GEYJ222	Metal	2.2K ohms 1/16W
R40	ERJ3GEYJ103	Metal	10K ohms 1/16W
R41	ERJ3GEYJ102	Metal	1K ohms 1/16W
R42	ERJ3GEYJ912	Metal	9.1K ohms 1/16W
R43	ERJ3GEYJ242	Metal	2.4K ohms 1/16W
R44	ERJ3GEYJ622	Metal	6.2K ohms 1/16W
R45	ERJ3GEYJ202	Metal	2K ohms 1/16W
R46	ERJ3GEYJ391	Metal	390 ohms 1/16W
R47	ERJ3GEYJ103	Metal	10K ohms 1/16W
R48	ERJ3GEYJ102	Metal	1K ohms 1/16W
R49	ERJ3GEYJ103	Metal	10K ohms 1/16W
R50	ERJ3GEYJ222	Metal	2.2K ohms 1/16W
R51	ERJ3GEYJ102	Metal	1K ohms 1/16W
R52	ERJ3GEYJ562	Metal	5.6K ohms 1/16W
R53	ERJ3GEYJ103	Metal	10K ohms 1/16W
R54	ERJ3GEYJ392	Metal	3.9K ohms 1/16W
R57	ERJ3GEYJ123	Metal	12K ohms 1/16W
R58	ERJ3GEYJ100	Metal	10 ohms 1/16W
R59	ERJ3GEYJ104	Metal	100K ohms 1/16W
R60	ERJ3GEYJ682	Metal	6.8K ohms 1/16W
R61,62	ERJ3GEYJ562	Metal	5.6K ohms 1/16W
R63	ERJ3GEYJ472	Metal	4.7K ohms 1/16W
R64	ERJ3GEYJ683	Metal	68K ohms 1/16W
R65	ERJ3GEYJ121	Metal	120 ohms 1/16W
R66	ERJ3GEYJ102	Metal	1K ohms 1/16W
R67	ERJ3GEYJ103	Metal	10K ohms 1/16W
R68	ERJ3GEYJ121	Metal	120 ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	
R69	ERJ3GEYJ512	Metal	5.1K ohms 1/16W
R70,71	ERJ3GEYJ102	Metal	1K ohms 1/16W
R73,75	ERJ3GEYJ105	Metal	1M ohms 1/16W
R76,77	ERJ3GEYJ103	Metal	10K ohms 1/16W
R81	ERJ3GEYJ221	Metal	220 ohms 1/16W
R86	ERJ3GEYJ362	Metal	3.6K ohms 1/16W
R87	ERJ3GEYJ363	Metal	36K ohms 1/16W
R88	ERJ3GEYJ102	Metal	1K ohms 1/16W
R89	ERJ3GEYJ154	Metal	150K ohms 1/16W
R90,91	ERJ3GEYJ392	Metal	3.9K ohms 1/16W
R107	ERJ3GEYJ222	Metal	2.2K ohms 1/16W
R108,109	ERJ3GEYJ472	Metal	4.7K ohms 1/16W
R111	ERJ3GEYJ103	Metal	10K ohms 1/16W
R112	ERJ3GEYJ562	Metal	5.6K ohms 1/16W
R116	ERJ3GEYJ223	Metal	22K ohms 1/16W
R117	ERJ3GEYJ472	Metal	4.7K ohms 1/16W
R118	ERJ3GEYJ182	Metal	1.8K ohms 1/16W
R119	ERJ3GEYJ331	Metal	330 ohms 1/16W
R120	ERJ3GEYJ472	Metal	4.7K ohms 1/16W
VR2	EVM13SW00B14	Variable Resistor	10K ohms
VR3	EVM13SW00B15	Variable Resistor	100K ohms
VR4	EVM13SW00B13	Variable Resistor	1K ohms
VR5	EVM13SW00B14	Variable Resistor	10K ohms
VR7	EVML1GA00B54	Variable Resistor	54K ohms
VR8	EVML1GA00B14	Variable Resistor	10K ohms
C1	YW5F104Z2VB	Ceramic	0.1 µF
C2	ECEA1AKK100	Electrolytic	10 µF 10V
C3	YW5CH101J5VB	Ceramic	100 pF
C4	YW5F104Z2VB	Ceramic	0.1 µF
C5	ECST1VY334	Tantalumc	0.33 µF 35V
C6	ECEA1AKK100	Electrolytic	10 µF 6.3V
C7	YW5F104Z2VB	Ceramic	0.1 µF
C8	ECEA1HS4R7	Electrolytic	4.7 µF 50V
C9	ECEA0GKS470	Electrolytic	47 µF 4V
C10	ECEA1AKS470	Electrolytic	47 µF 10V
C11	YW5X222K5VB	Ceramic	2200 pF
C12	YW5F104Z2VB	Ceramic	0.1 µF
C13	ECEA1AS470	Electrolytic	47 µF 10V
C17	YF426104XKS	Ceramic	0.1 µF
C18	YW5F104Z2VB	Ceramic	0.1 µF
C19	YW5F473Z2VB	Ceramic	0.047 µF
C20	ECEA0GKS470	Electrolytic	47 µF 4V
C21	YW5F104Z2VB	Ceramic	0.1 µF
C22	ECEA1AKS470	Electrolytic	47 µF 10V
C23	YW5F104Z2VB	Ceramic	0.1 µF
C24	ECEA0JS470	Electrolytic	47 µF 6.3V
C25-31	YW5F104Z2VB	Ceramic	0.1 µF
C32	YW5CH470J5VB	Ceramic	47 pF
C33	YW5F123Z2VB	Ceramic	0.012 µF
C34	YW5CH101J5VB	Ceramic	100 pF
C35	YW5F104Z2VB	Ceramic	0.1 µF
C36	YW400393XKT	Ceramic	0.039 µF
C37,38	YW426202CHJT	Ceramic	2000 pF
C39	ECEA1HKS010	Electrolytic	1µF 50V
C40	ECEA1AKK100	Electrolytic	10 µF 10V

REF.NO.	PART NO.	DESCRIPTION
C41	YW5CH101J5VB	Ceramic 100 pF
C43	YF400471CHJT	Ceramic 470 pF
C44	YW5CH121J5VB	Ceramic 120 pF
C46	YW5CH330J5VB	Ceramic 33 pF
C47	ECSF1CE106	Tantalum 10 µF 16V
C48	YW5X103K2VB	Ceramic 0.01 µF
C49	YW5F104Z2VB	Ceramic 0.1 µF
C50,51	YW5CH151J5VB	Ceramic 150 pF
C53	YW5F104Z2VB	Ceramic 0.1 µF
C54	ECSF1CE105	Tantalum 1 µF 16V
C55	ECSF1CE225	Tantalum 2.2 µF 16V
C56	YW400393XKT	Ceramic 0.039 µF
C57	YWT316B104MT	Ceramic 0.1 µF
C65	YW5X103K2VB	Ceramic 0.01 µF
C66	ECSF1CE106	Tantalum 10 µF 16V
C67	YW5CH101J5VB	Ceramic 100 pF
C70	ECEA0JKA470	Electrolytic 47 µF 6.3V (KA)
C71	ECSF1AE106	Tantalum 10 µF 10V
C100	ECCF1H220JC	Ceramic 22 pF 50V
C101	ECQM1H333KZ	Plastic 0.033 µF 50V
CT1	ECRJA020E11	Trimmer Capacitor
L1	YWNL322R2K	Coil 2.2 µH
L2,3	YFF3216A2R2K	Coil 2.2 µH
L4	YWNL322R2K	Coil 2.2 µH
L5,6	YFF3216E8R2K	Coil 8.2 µH
L7	YWS5LD30426	Coil
X1	YWHC49US1773	Crystal Oscillator
CF1	YWELB4C015	Filter
CF2	YWELB5B022	Filter
CF4	YWELB4K088	Filter
J1,3	ERJ3GEY0R00	Jumper Resistor
J74,79	ERJ3GEY0R00	Jumper Resistor
J80,82	ERJ3GEY0R00	Jumper Resistor
J85	ERJ3GEY0R00	Jumper Resistor
CN1	YW530201410	14-pin Connector
CN2	YW530202610	26-pin Connector
M31	YWV2HA0546A4	Shield Parts
M32	YWV2HA0624A4	Shield Parts
M33	YWV2HA0625A4	Shield Parts

DC/DC BOARD

PCB4 (NLA)	YWVKYBL20P4A	Printed Circuit Board Assy
IC1,2	NJM3414M	IC
IC3	YWM5236L	IC
Q1	2SD1820-QRS	Transistor
Q2	2SC3303-0Y	Transistor
Q3	2SB793-RS	Transistor
Q4	2SD973-QRS	Transistor
Q5	2SD1819-QRS	Transistor
Q6	2SC3931-CD	Transistor
Q7	2SD1819-QRS	Transistor

REF.NO.	PART NO.	DESCRIPTION
Q8	2SB1218-QRS	Transistor
Q9,10	2SD1819-QRS	Transistor
Q11	2SB1218-QRS	Transistor
Q12,13	2SD1819-QRS	Transistor
Q14	2SB1218-QRS	Transistor
D1	MA170	Diode
D2-4	EU01AV0	Diode
D5	RD22EB4	Diode
D6	RD13EB1	Diode
D7	MA153	Diode
D8	SS1.5J4	Diode
R2	ERJ3GEYJ332	Metal 3.3K ohms 1/16W
R3	ERJ3GEYJ202	Metal 2K ohms 1/16W
R4	ERJ3GEYJ301	Metal 300 ohms 1/16W
R5,6	R1220P432D	Metal 4.3K ohms
R7	YWR1220P202D	Metal 2K ohms
R8	YWR1220P101D	Metal 100 ohms
R9	YFR1220P203D	Metal 20K ohms
R10	ERJ3GEYJ470	Metal 47 ohms 1/16W
R11	ERJ3GEYJ331	Metal 330 ohms 1/16W
R12	ERJ3GEYJ102	Metal 1K ohms 1/16W
R13	YWR1220P182D	Metal 1.8K ohms
R14,15	YWR1220P302D	Metal 3K ohms
R16	YWR1220P182D	Metal 1.8K ohms
R18	ERJ3GEYJ182	Metal 1.8K ohms 1/16W
R19,20	ERSA18J102	Solid Resistor 1K ohms 1/8W
R21	ERJ3GEYJ681	Metal 680 ohms 1/16W
R22	ERJ3GEYJ242	Metal 2.4K ohms 1/16W
R23	ERJ3GEYJ683	Metal 68K ohms 1/16W
R24	ERJ3GEYJ223	Metal 22K ohms 1/16W
R25	ERJ3GEYJ270	Metal 27 ohms 1/6W
R26	ERJ3GEYJ332	Metal 3.3K ohms 1/16W
R27,28	ERJ3GEYJ222	Metal 2.2K ohms 1/16W
R29,30	ERJ3GEYK2R2	Metal 2.2 ohms 1/16W
R31	YWR1220P332D	Metal 3.3K ohms
R32	R1220P123D	Metal 12K ohms
R33	ERJ3GEYJ472	Metal 4.7K ohms 1/16W
R34	ERJ3GEYJ332	Metal 3.3K ohms 1/16W
R35,36	ERJ3GEYJ392	Metal 3.9K ohms 1/16W
R37	ERJ3GEYJ620	Metal 62 ohms 1/16W
R38	ERJ3GEYJ332	Metal 3.3K ohms 1/16W
R39	ERJ3GEYJ102	Metal 1K ohms 1/16W
R40	ERJ3GEYJ392	Metal 3.9K ohms 1/16W
R41	ERJ3GEYJ472	Metal 4.7K ohms 1/16W
R42	ERJ3GEYJ100	Metal 10 ohms 1/16W
R46	ERJ3GEYJ221	Metal 220 ohms 1/16W
R47	ERJ3GEYJ471	Metal 470 ohms 1/16W
R48	ERJ3GEYJ153	Metal 15K ohms 1/16W
R49	YWR1220P753D	Metal 75K ohms
R50	YWR1220P103D	Metal 10K ohms
R51	ERJ3GEYJ511	Metal 510 ohms 1/16W
R53,54	ERJ3GEYJ333	Metal 33K ohms 1/16W
R55	ERJ3GEYJ101	Carbon 100 ohms 1/16W
VR1	EVML1GA00B53	Variable Resistor 5K ohms
C1	ECEA1CU101	Electrolytic 100 µF 16V

REF.NO.	PART NO.	DESCRIPTION
C2	YF400104FZT	Ceramic 0.1 µF
C3	YW5X102K5VB	Ceramic 1000 pF
C4	ECEA1HKS2R2	Electrolytic 2.2 µF 50V
C5	ECEA1AFS221	Electrolytic 220 µF 10V
C6	YF400A272XKT	Ceramic 2700 pF
C7	ECEA1EU101	Electrolytic 100 µF 25V
C8	ECEA1AU221	Electrolytic 220 µF 10V
C9	ECEA1CU101	Electrolytic 100 µF 16V
C10	ECEA1EU470	Electrolytic 47 µF 25V
C11	ECEA1AU221	Electrolytic 220 µF 10V
C12	ECEA1EU470	Electrolytic 47 µF 25V
C13	ECEA1AKS470	Electrolytic 47 µF 10V
C14	ECEA1AU470	Electrolytic 47 µF 10V
C15	YF400104FZT	Ceramic 0.1 µF
C16	ECEA0JS470	Electrolytic 47 µF 6.3V
C17	ECSF0JE476	Electrolytic 47 µF 6.3V
C18	ECEA1CU470	Electrolytic 47 µF 16V
C19	ECEA0JU101	Electrolytic 100 µF 6.3V
C20,21	ECEA1AKK100	Electrolytic 10 µF 10V
C22	ECEA1CU471	Electrolytic 470 µF 16V
C23	ECEA1EU101	Electrolytic 100 µF 25V
C24	ECQM1H104JZ	Plastic 0.1 µF 50V
C26	ECEA0JS470	Electrolytic 47 µF 6.3V
C27,28	ECSF1EE106	Tantalum 10 µF 25V
L1	ELC08G010	Coil 100 µH
L2	EL05SI221K	Coil 220 µH
L3	ELC08G006	Coil
L4	EL05SI221K	Coil 220 µH
L5	YFEL05SI2R2K	Coil 2.2 µH
T1	ETE13K57AY	Power Transformer
SW1-3	YWSSSJ112	Slide Switch
CF1	YWELB4C016	Filter
F1	YFSSFR800	Current Fuse
J3,43	ERJ3GEY0R00	Jumper Resistor
CN1	YW530202610	26-pin Connector
M35	YWV2HA0494A4	Shield Parts

MOTHER BOARD

PCB5 (NLA)	YWVKYBL20P5A	Printed Circuit Board Assy
IC1	NJM3414M	IC
Q1	2SB709-QRS	Transistor
Q2	XN6401	Transistor
Q3	XN6501	Transistor
Q6	2SD601-RS	Transistor
Q7	2SB709-QRS	Transistor
R1	YWR1220P152D	Metal 1.5K ohms
R2	YWR1220P112D	Metal 1.1K ohms
R3	YF2116181JT	Carbon 180 ohms 1/16W
R4	YWR1220P361D	Metal
R5	YF2116103JT	Carbon 10K ohms 1/16W
R6	YWR1220P182D	Metal 1.8K ohms
R7	YWR1220P361D	Metal 360 ohms
R8	YF2116392JT	Carbon 3.9K ohms 1/16W
R9	YWR1220P512D	Metal 5.1K ohms
R10	YFR1220P222D	Metal 2.2K ohms
R11	YF2116913JT	Carbon 91K ohms 1/16W
R12	YF2116751JT	Carbon 750 ohms 1/16W
R14	YF2116132JT	Carbon 1.3K ohms 1/16W
R15	YF2116750JT	Carbon 75 ohms 1/16W
VR1	EVM7YSW00BQ2	Variable Resistor 470 ohms
VR2	EVM7YSW00B13	Variable Resistor 1K ohms
VR3	EVML3GA00B16	Variable Resistor 1M ohms
C1	ECST1AC106ZR	Electrolytic 10 µF 10V
C2,3	YF400104FZT	Ceramic 0.1 µF
C4,5	ECST1CC106ZR	Ceramic 10 µF16V
L1	YFF3216A2R2K	Coil 2.2 µH
CN1,2	YW520222610	26-pin Connector
CN3	YW520221410	14-pin Connector
CN4	YW520222610	26-pin Connector
CN5	EMCS0250Z	2-pin Connector
CN6	EMCS0350Z	3-pin Connector
CN7	EMCS0450Z	4-pin Connector
M34	YFV1KA0002A4	Washer

LED BOARD

PCB6	YWVRZD130J1B	Printed Board
D1	LN238RPH	Diode

SWITCH BOARD

PCB7	YWVRYBL20P7B	Printed Board
R1	ERDS2FJ101	Carbon 100 ohms 1/4W
SW1	YWSSSS912L4	Slide Switch
SW4	SSS342L4N	Slide Switch

ALC BOARD

PCB8	YWVRYBL20P8A	Printed Board
C1-3	YF400101CHJT	Ceramic 100 pF
L1-4	YWNL32R68K	Coil 068 µH

REF.NO.	PART NO.	DESCRIPTION
PROCESS SUB BOARD		
PCB9 (NLA)	YWVKYBL20E9A	Printed Circuit Board Assy
IC1	YWM51269FP	IC
R1,2	ERJ3GEYJ242	Metal 2.4K ohms 3W
C1	YW5CH101J5VB	Ceramic 100 pF
C2,3	ECST1AC106ZR	Tantalum 10 µF 10V
C4	ECST1AD476ZR	Tantalum 47 µF 10V
M47	YWV2HA0701A4	Shield Parts
POWER BOARD		
IC1	YWMA1050	IC
IC2	YWUPC1093J	IC
D1	YWS1VB40	Diode
D2	YWERA15-04	Diode
D3	ERB84-009	Diode
V1	YW450NR-07D	Varister
ZD1	YWRD13EB3	Zener Diode
PC1,2	YWPC111-B	Photo Coupler
R1	ERDS2TJ824	Carbon 820K ohms 1/4W
R2	ERG2ANJ823	Metal 82K ohms 2W
R3	ERDS2TJ331	Carbon 330 ohms 1/4W
R4	ERDS2TJ151	Carbon 150 ohms 1/4W
R5	ERG2ANJ683	Metal 68K ohms 2W
R6	ER025CKF1502	Metal 15K ohms 1/4W (For WV-BL200/A,B only)
R7	ERDS2TJ271	Carbon 270 ohms 1/4W
R8	ER025CKF1502	Metal 15K ohms 1/4W
R9	ER025CKF4301	Metal 4.3K ohms 1/4W
R10	ERDS2TJ222	Carbon 2.2K ohms 1/4W
R11	ERDS2TJ271	Carbon 270 ohms 1/4W
R12	ERDS2TJ151	Carbon 150 ohms 1/4W
C1	B81121-CB125	Film 0.1 µF 250V
C2	UPC2G100MRH	Electrolytic 10 µF 400V
C3	UIT2GR47MPA	Electrolytic 0.47 µF 400V
C4	DE0705B101K1	Ceramic 100 pF 1KV
C5	UMT1H010MCH	Electrolytic 1 µF 50V
C6,7	UPF1C181MPH	Electrolytic 180 µF 16V
C8	AMZ-332K50	Film 3300 pF 50V
C9,10	DE7100FZ472P	Ceramic 4700 pF 400V
C11	UST1C101MCH	Electrolytic 100 µF 16V
C12	YWXE472	Film 4700 pF 250V
C13	AMZ-332K50	Film 3300 pF
L1	L4047	Line Filter
L2	YWCH0608-700	Coil
F1 ⚠	XBA2C04TR0	Fuse 0.4A 250V

REF.NO.	PART NO.	DESCRIPTION
E1	YFPU51212	Fuse Holder
PT1	YWPT-P30	Power Transformer
CN1	EMCS0450Z	4-pin Connector
M51	YWD40453001A	Case
M52	YWD40453002A	Cover
M53	YWD40455001B	Shield Case
M54	YWD40195001A	Heat Sink
ACCESSORY PARTS/PACKAGING PARTS		
CN110	YFE4191J100	ALC Connector
M61	YWV8QA1712AN	Operating Instructions
M62	YW-FP10	Cleaning Paper
M63	YWT050803	Polyethylene Bag
M64	YWT20X35C03	Polyethylene Bag (X3)
M65	YWV9CA1247AN	Packaging for WV-BL200/A
	YWV9CA1242AN	Packaging for WV-BL200/B
	YWV9CA1245AN	Packaging for WV-BL200/C
	YWV9CA1246AN	Packaging for WV-BL200/G
M66	YWV7SA0942A4	Packaging Label

REF.NO.	PART NO.	DESCRIPTION
CCTV CAMERA WV-BL202		
MISCELLANEOUS		
Q101	2SB941-PQR	Transistor
SW101	YFMFS201N	Camera Selection Switch
CN101,102	YWHXC0325900	BNC Connector
CN103	YFD4151N200	ALC Connector
M1	YWV5WA0887A4	Left Side Panel
M2	YWV5WC0888A4	Rear Panel
M3	YWV5WB0894A4	Right Side Panel
M5	YFV5EA0359A4	Blank Cover
M6	YWV5EA0635A2	Bottom Cover
M7	YWV5EA0636A2	Upper Cover
M8	YFV5BA0026A3	Escutcheon
M10	YWV2TB0169A3	Mounting Bracket
M11	YWV2PA0315A4	Insulator
M12	YWV2HA0622A4	Shield Cover A
M13	YWV2HA0623A4	Shield Cover B
M16	YFV2PA0188A4	Insulator
M18 ⚠	YFV7MA0099A4	Safety Label
M23 ⚠	YWV7QA1810A4	Main Label
M24	YWV7SA0943A4	Blank Label
M25	YFV2PA0207A4	Insulator Sheet
M26	YFV2NA0084A4	Spacer
M29	YWV2EA0116A3	Guide
M30	YWV5GA0068A4	Cap
M36	YWV5BA0060A2	Escutcheon
M37	YWV9BA0010AN	Optical Ass'y
M38	YWV2SA1316A2	Mounting Angle
M39	YWV4JA0262A4	Spring
M40	YWV1EA0127A4	Special Screw
M41	YWV1EA0128A4	Special Screw
M42	YWV3FA0101A3	Ring
M43	YWBC-2B	Body Cap
M44	YWV2KA0491A2	Rear Chassis
M45	YWV2SA1314A4	Mounting Angle
M46	YWV7DA0220A4	Heat Sink
SENSOR BOARD		
Refer to replacement parts list for WV-BL200		
DRIVE BOARD		
Refer to replacement parts list for WV-BL200		
PROCESS BOARD		
Refer to replacement parts list for WV-BL200		

REF.NO.	PART NO.	DESCRIPTION	
DC/DC BOARD			
PCB4 (NLA)	YWVKYBL20J4A	Printed Circuit Board Assy	
IC1,2	NJM3414M	IC	
IC3	YWM5236L	IC	
Q1	2SD1820-QRS	Transistor	
Q2	2SC3303-0Y	Transistor	
Q3	2SB793-RS	Transistor	
Q4	2SD973-QRS	Transistor	
Q5	2SD1819-QRS	Transistor	
Q6	2SC3931-CD	Transistor	
Q7	2SD1819-QRS	Transistor	
Q8	2SB1218-QRS	Transistor	
Q9,10	2SD1819-QRS	Transistor	
Q11	2SB1218-QRS	Transistor	
Q12,13	2SD1819-QRS	Transistor	
Q14	2SB1218-QRS	Transistor	
D1	MA170	Diode	
D2-4	EU01AV0	Diode	
D5	RD22EB4	Diode	
D6	RD13EB1	Diode	
D7	MA153	Diode	
D8	SS1.5J4	Diode	
R2	ERJ3GEYJ332	Metal	3.3K ohms 1/16W
R3	ERJ3GEYJ202	Metal	2K ohms 1/16W
R4	ERJ3GEYJ301	Metal	300 ohms 1/16W
R5,6	R1220P432D	Metal	4.3K ohms
R7	YWR1220P202D	Metal	2K ohms
R8	YWR1220P101D	Metal	100 ohms
R9	YFR1220P203D	Metal	20K ohms
R10	ERJ3GEYJ470	Metal	47 ohms 1/16W
R11	ERJ3GEYJ331	Metal	330 ohms 1/16W
R12	ERJ3GEYJ102	Metal	1K ohms 1/16W
R13	YWR1220P182D	Metal	1.8K ohms
R14,15	YWR1220P302D	Metal	3K ohms
R16	YWR1220P182D	Metal	1.8K ohms
R18	ERJ3GEYJ182	Metal	1.8K ohms 1/16W
R19,20	ERSA18J102	Solid Resistor	1K ohms 1/8W
R21	ERJ3GEYJ681	Metal	680 ohms 1/16W
R22	ERJ3GEYJ242	Metal	2.4K ohms 1/16W
R23	ERJ3GEYJ683	Metal	68K ohms 1/16W
R24	ERJ3GEYJ223	Metal	22K ohms 1/16W
R25	ERJ3GEYJ270	Metal	27 ohms 1/6W
R26	ERJ3GEYJ332	Metal	3.3K ohms 1/16W
R27,28	ERJ3GEYJ222	Metal	2.2K ohms 1/16W
R29,30	ERJ3GEYK2R2	Metal	2.2 ohms 1/16W
R31	YWR1220P332D	Metal	3.3K ohms
R32	R1220P123D	Metal	12K ohms
R33	ERJ3GEYJ472	Metal	4.7K ohms 1/16W
R34	ERJ3GEYJ332	Metal	3.3K ohms 1/16W
R35,36	ERJ3GEYJ392	Metal	3.9K ohms 1/16W
R37	ERJ3GEYJ620	Metal	62 ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION
R38	ERJ3GEYJ332	Metal 3.3K ohms 1/16W
R39	ERJ3GEYJ102	Metal 1K ohms 1/16W
R40	ERJ3GEYJ392	Metal 3.9K ohms 1/16W
R41	ERJ3GEYJ472	Metal 4.7K ohms 1/16W
R42	ERJ3GEYJ100	Metal 10 ohms 1/16W
R46	ERJ3GEYJ221	Metal 220 ohms 1/16W
R47	ERJ3GEYJ471	Metal 470 ohms 1/16W
R48	ERJ3GEYJ153	Metal 15K ohms 1/16W
R49	YWR1220P753D	Metal 75K ohms
R50	YWR1220P103D	Metal 10K ohms
R51	ERJ3GEYJ511	Metal 510 ohms 1/16W
R53,54	ERJ3GEYJ333	Metal 33K ohms 1/16W
R55	ERJ3GEYJ101	Carbon 100 ohms 1/16W
VR1	EVML1GA00B53	Variable Resistor 5K ohms
C1	ECEA1CU101	Electrolytic 100F 16V
C2	YF400104FZT	Ceramic 0.1 µF
C3	YW5X102K5VB	Ceramic 1000 pF
C4	ECEA1HKS2R2	Electrolytic 2.2µF 50V
C5	ECEA1AFS221	Electrolytic 220µF 10V
C6	YF400A272XKT	Ceramic 2700 pF
C7	ECEA1EU101	Electrolytic 100 µF 25V
C8	ECEA1AU221	Electrolytic 220µF 10V
C9	ECEA1CU101	Electrolytic 100µF 16V
C10	ECEA1EU470	Electrolytic 47µF 25V
C11	ECEA1AU221	Electrolytic 220µF 10V
C12	ECEA1EU470	Electrolytic 47µF 25V
C13	ECEA1AKS470	Electrolytic 47µF 10V
C14	ECEA1AU470	Electrolytic 47µF 10V
C15	YF400104FZT	Ceramic 0.1 µF
C16	ECEA0JS470	Electrolytic 47 µF 6.3V
C17	ECSF0JE476	Electrolytic 47 µF 6.3V
C18	ECEA1CU470	Electrolytic 47µF 16V
C19	ECEA0JU101	Electrolytic 100 µF 6.3V
C20,21	ECEA1AKK100	Electrolytic 10µF 10V
C22	ECEA1CU471	Electrolytic 470µF 16V
C23	ECEA1EU101	Electrolytic 100 µF 25V
C24	ECQM1H104JZ	Plastic 0.1 µF 50V
C26	ECEA0JS470	Electrolytic 47 µF 6.3V
C27,28	ECSF1EE106	Electrolytic 10 µF 25V
L1	ELC08G010	Coil 100 µH
L2	EL05SI221K	Coil 220 µH
L3	ELC08G006	Coil
L4	EL05SI221K	Coil 220 µH
L5	YFEL05SI2R2K	Coil 2.2 µH
T1	ETE13K57AY	Power Transformer
SW1,3	YWSSSJ112	Slide Switch
CF1	YWELB4C016	Filter
F1	YFSSFR800	Current Fuse
J3,43	ERJ3GEY0R00	Jumper Resistor
CN1	YW530202610	26-pin Connector
M35	YWV2HA0494A4	Shield Parts

REF.NO.	PART NO.	DESCRIPTION
MOTHER BOARD		
PCB5 (NLA)	YWVKYBL20J5A	Printed Circuit BoardAssy
IC1	NJM3414M	IC
Q1	2SB709-QRS	Transistor
Q2	XN6401	Transistor
Q3	XN6501	Transistor
Q6	2SD601-RS	Transistor
Q7	2SB709-QRS	Transistor
R1	YWR1220P152D	Metal 1.5K ohms
R2	YWR1220P112D	Metal 1.1K ohms
R3	YF2116181JT	Carbon 180 ohms 1/16W
R4	YWR1220P361D	Metal 360 ohms
R5	YF2116103JT	Carbon 10K ohms 1/16W
R6	YWR1220P182D	Metal 1.8K ohms
R7	YWR1220P361D	Metal 360 ohms
R8	YF2116392JT	Carbon 3.9K ohms 1/16W
R9	YWR1220P512D	Metal 5.1K ohms
R10	YFR1220P222D	Metal 2.2K 0HMS
R11	YF2116913JT	Carbon 91K ohms 1/16W
R12	YF2116751JT	Carbon 750 ohms 1/16W
R14	YF2116132JT	Carbon 1.3K ohms 1/16W
R15	YF2116750JT	Carbon 75 ohms 1/16W
VR1	EVM7YSW00BQ2	Variable Resistor 470 ohms
VR2	EVM7YSW00B13	Variable Resistor 1K ohms
C1	ECST1AC106ZR	Electrolytic 10 F 10V
C2,3	YF400104FZT	Ceramic 0.1 F
C4,5	ECST1CC106ZR	Tantalum 10F16V
L1	YFF3216A2R2K	Coil 2.2 H
CN1,2	YW520222610	26-pin Connector
CN3	YW520221410	14-pin Connector
CN4	YW520222610	26-pin Connector
CN5	EMCS0250Z	2-pin Connector
CN6	EMCS0350Z	3-pin Connector
CN7	EMCS0250Z	2-pin Connector
M34	YFV1KA0002A4	Washer
LED BOARD		
Refer to replacement parts list for WV-BL200		
SWITCH BOARD		
PCB7	YWVRYBL20P6B	Printed Board
R1	ERDS2FJ101	Carbon 100 ohms 1/4W
C1	ECKF1H222KB	Ceramic 2200 pF 50V
SW1	YWSSSS912L4	Slide Switch
SW4	SSS342L4N	Slide Switch
E10	YF40S1BYF2P	Terminal
M48	YFV2NA0071A4	Spacer

REF.NO.	PART NO.	DESCRIPTION
ALC BOARD		
Refer to replacement parts list for WV-BL200		
PROCESS SUB BOARD		
Refer to replacement parts list for WV-BL200		
ACCESSORY PARTS/PACKAGING PARTS		
CN110	YFE4191J100	ALC Connector
M61	YWV8QA1713AN	Operating Instructions
M62	YW-FP10	Cleaning Paper
M63	YWT20X25C03	Polyethylene Bag
M64	YWT20X35C03	Polyethylene Bag
M65	YWV9CA1248AN	Packaging Assy
M66	YWV7SA0942A4	Packaging Label
CCTV CAMERA WV-BL204		
MISCELLANEOUS		
Q101	2SB941-PQR	Transistor
SW101	YFMFS201N	Slide Switch
CN101,102	YWHXC0325900	BNC Connector
CN103	YFD4151N200	ALC Connector
M1	YWV5WC0884A4	Left Side Bottom Panel
M2	YWV5WA0889A4	Rear Panel
M3	YWV5WE0893A4	Bottom Panel
M5	YFV5EA0359A4	Blank Cover
M6	YWV5EA0632A2	Bottom Cover
M7	YWV5EA0633A2	Upper Cover
M8	YFV5BA0026A3	Escutcheon
M9	YWV2SA1315A2	Mounting Angle
M10	YWV2TB0169A3	Mounting Bracket
M11	YWV2PA0315A4	Insulator
M12	YWV2HA0622A4	Shield Cover 1 for Drive Board
M13	YWV2HA0623A4	Shield Cover 2 for Drive Board
M14	YFV2FA0122A4	Cushion
M16	YFV2PA0188A4	Insulator
M18	YFV7MA0099A4	Safety Label
M21	YWV7MA0270A4	Safety Label
M23	YWV7QA1811A4	Main Label
M25	YFV2PA0207A4	Insulator
M26	YFV2NA0084A4	Spacer
M29	YWV2EA0116A3	Guide

REF.NO.	PART NO.	DESCRIPTION
M30	YWV5GA0068A4	Cap
M36	YWV5BA0060A2	Escutcheon
M37	YWV9BA0010AN	CCD Image Sensor Ass'y
M38	YWV2SA1316A2	Mounting Angle
M39	YWV4JA0262A4	Spring
M40	YWV1EA0127A4	Special Screw
M41	YWV1EA0128A4	Special Screw
M42	YWV3FA0101A3	Ring
M43	YWBC-2B	Body Cap
M44	YWV2KA0491A2	Rear Chassis
M45	YWV2SA1314A4	Mounting Angle
M46	YWV7DA0220A4	Heat Sink
SENSOR BOARD		
Refer to replacement parts list for WV-BL200		
DRIVE BOARD		
Refer to replacement parts list for WV-BL200		
PROCESS BOARD		
Refer to replacement parts list for WV-BL200		
DC/DC BOARD		
Refer to replacement parts list for WV-BL200		
MOTHER BOARD		
Refer to replacement parts list for WV-BL200		
LED BOARD		
Refer to replacement parts list for WV-BL200		
SWITCH BOARD		
PCB7	YWVRYBL20P6B	Printed Board
R1	ERDS2FJ101	Carbon 100 ohms 1/4W
C1,2	ECKF1H222KB	Ceramic 2200 pF 50V
SW1	YWSSSS912L4	Slide Switch
SW4	SSS342L4N	Slide Switch
E10	YW40S1BYF3P	3-pin Terminal
M48	YWV2NA0199A4	Spacer

REF.NO.	PART NO.	DESCRIPTION
ALC BOARD		
Refer to replacement parts list for WV-BL200		
PROCESS SUB BOARD		
Refer to replacement parts list for WV-BL200		
POWER BOARD		
IC1	YWUPC1093J	IC
Q1	2SC3568-K	Transistor
Q2	2SD471	Transistor
D1	YWDS2SB60	Diode
D2	ERB44-02	Diode
D3	1SS55	Diode
D4	ERB84-009	Diode
ZD1	YWRD4.3EB1	Zener Diode
ZD2	YWRD13EB3	Zener Diode
PC1,2	YWPS24011KY	Photo Coupler
R1	ERDS2TJ153	Carbon 15K ohms 1/4W
R2	ERG1SJ332	Metal 3.3K ohms 1W
R3	ERDS2TJ151	Carbon 150 ohms 1/4W
R4	ERDS1TJ151	Carbon 150 ohms 1/4W
R5	ERDS2TJ821	Carbon 820 ohms 1/4W
R6	ERDS2TJ471	Carbon 470 ohms 1/4W
R7	ERG1SJ222	Metal 2.2K ohms 1W
R8	ER025CKF2700	Metal 270 ohms 1/4W
R9	ERDS2TJ681	Carbon 680 ohms 1/4W
R10	ER025CKF1502	Metal 15K ohms 1/4W
R11	ER025CKF4301	Metal 4.3K ohms 1/4W
R12	ERDS2TJ222	Carbon 2.2K ohms 1/4W
C1	YWAMZ474K50	Film 0.47 µF
C2	ECEA1HGE471	Electrolytic 470 µF 50V
C3	ECEA1HGE010	Electrolytic 1 µF 50V
C4	YWAMZ683K50	Film 0.068 µF 50V
C5	YWAMZ333K50	Film 0.033 µF 50V
C6	UET1H010MAH	Electrolytic 1 µF 50V
C7	ECEA1EFE471	Electrolytic 470 µF 25V
C8	AMZ-332K50	Film 3300 pF 50V
C9	ECEA1CGE101	Electrolytic 100 µF 16V
C10	DE7100F222MV	Ceramic 2200 pF 400V
L1	YWSU9V-07010	Line Filter
L2	YWCH0608-700	Coil
F1 ⚠	XBA2C20ET0A	Fuse 2A 250V
E1	YFPU51212	Fuse Holder
PT1	YWPT-58-KT	Power Transformer
CN1	EMCS0450Z	4- pin Connector
M51	YWD40453001A	Case
M52	YWD40453002A	Cover
M53	YWD40455001A	Shield Case
M54	YWD40195002A	Heat Sink

REF.NO.	PART NO.	DESCRIPTION
ACCESSORY PARTS/PACKAGING PARTS		
CN110	YFE4191J100	ALC Connector
M61	YWV8QA1712AN	Operating Instructions
M62	YW-FP10	Cleaning Paper
M64	YWT20X35C03	Polyethylene Bag (X2)
M65	YWV9CA1244AN	Packaging Assy
M66	YWV7SA0942A4	Packaging Label